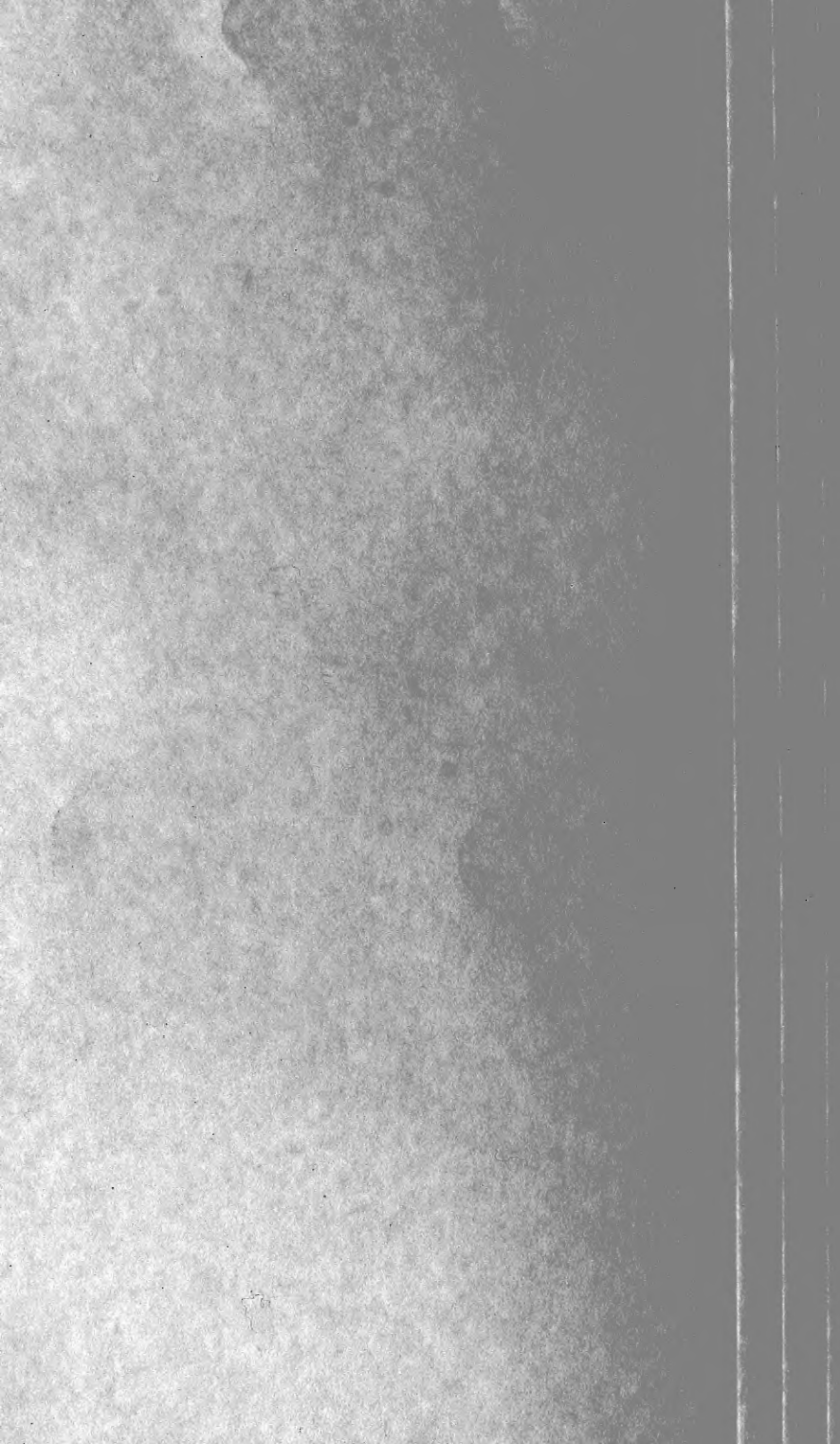


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PROCEEDINGS AND TRANSACTIONS,

OF

British

(THE SOUTH LONDON)

**Entomological and Natural History
Society.**

1943-44.

WITH FOUR PLATES



**PUBLISHED AT THE SOCIETY'S ROOMS,
THE CHAPTER HOUSE, ST THOMAS' STREET, SOUTHWARK, S.E.1.**

1944.

PRICE SIX SHILLINGS AND SIXPENCE.

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PROCEEDINGS AND TRANSACTIONS

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1944.

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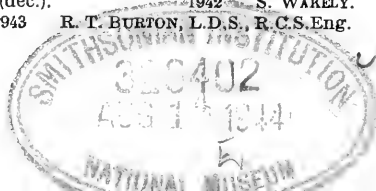
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1934	ATKINSON, J. L., "Down's Cottage," 76, Northwood Road, Tankerton, Kent. <i>l.</i>
1936	AUGUST, V. E., 59, Hillcross Avenue, Morden, Surrey. <i>ent.</i>

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- 1939 BAKER, D. B., F.R.E.S., 17, Florence Park, Bristol, 6, Glos. *l, c. A.F.*
- 1937 BALLINGER, D. E., "The Cottage," Canham Road, Acton, London, W.3. *l, A.F.*
- 1942 BANNER, JOHN V., M.R.C.S., L.R.C.P., R.A.M.C., "Wykehurst," 41, Varndean Gardens, Brighton, 6. *l. A.F.*
- 1896 BARNETT, T. L., 31, Littleheath Road, Selsdon, Surrey. *l*
- 1933 BAYNES, Capt. E. S. A., F.R.E.S., "Monkshatch Cottage," Comp-ton, near Guildford, Surrey. *l.*
- 1943 BECHER, Lt.-Col. L. E., "Newstead," Charterhouse Road, Godal-ming, Surrey. *l.*
- 1938 BEIRNE, B. P., PH.D., F.R.E.S., F.L.S., 4, Tobernea Terrace, Monks-town, Co. Dublin, Eire. *micro-l.*
- 1929 BELL, J. H., Dudswell Rise, Northchurch, Berkhamsted, Herts.
- 1942 BELL, P. J., B.A., F.L.S., Dudswell Rise, Berkhamsted, Herts. *ent. A.F.*
- 1911 BLAIR, K. G., D.S.C., F.R.E.S., 11, Durrington Park Road, Wimble-don, London, S.W.20. *n, c.*
- 1942 BLEST, T., "Homestead," Higham Lane, Tonbridge, Kent. *l.*
- 1926 BLISS, A., 4, Monahan Avenue, Purley, Surrey. *l.*
- 1941 BLOOD, B. N., L.R.C.S.I., 25, Spencer Gardens, Eltham, London, S.E.9. *hym.*
- 1925 BLYTH, S. F. P., "Cleeveland," Chislehurst, Kent. *l.*
- 1934 BORRER, C. D., "The Old Manor House," Cley-next-Sea, Norfolk. *ent.*
- 1935 BOWLES, T. J.
- 1933 BRETT, G. A., B.SC., A.R.C.S., D.I.C., Seale-Hayne Agricultural College, Newton Abbot, S. Devon. *ent.*
- 1935 BRETT, MRS KATHLEEN S. L. F., Torridge, 22, Keyberry Road, Newton Abbot, S. Devon. *biology.*
- 1940 BRITTEN, H., M.M., F.R.H.S., F.INST.P.A., "Newholme," 21, Toller's Lane, Old Coulsdon, Surrey. *ent (Chalcididae).*
- 1930 BROOKE, Miss W. M. A., 300, Philip Lane, London, N.15 *ec. ent, b, marine life.*
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- 1927 BULL, G. V., B.A., M.B., "White Gables," Sandhurst, Kent. *l.*

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- 1938 BURTON, Miss MARGARET, L.D.S., R.C.S.ENG., "Newlands," 212, Golders Green Road, London, N.W.11. *biology*.
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- 1922 BUSHBY, L. C., F.R.E.S., c/o Zoological Society of London, Regent's Park, London, N.W.8. *c, hem*.
- 1937 CARDEW, Col. P. A., *Council*, 21a, Thornton Hill, Wimbledon, London, S.W.19. *l*.
- 1899 CARR, Rev. F. M. B., M.A., L.TH., Ditton Vicarage, Widnes, Lancs. *l, n*.
- 1936 CHARTRES, S. A., F.R.E.S., 9, King's Drive, Eastbourne, Sussex. *ent*.
- 1922 CHEESEMAM, C. J., 26, Lyndhurst Road, Birkdale, Southport, Lancs. *l*.
- 1936 CLASSEY, E. W., F.R.E.S., R.A.M.C., 117, Sutton Lane, Hounslow, Mdx. *l A.F*.
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- 1934 COLE, G. A., M.A., F.C.A., Ronkswood Hospital, Newtown Road, Worcester. *l*.
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- 1938 CONDER, G. M., M.R.C.S., L.R.C.P., L.D.S., 33, Grove Avenue, Sutton, Surrey. *l A.F*.
- 1936 COOPER, B. A., B.SC., A.R.C.S., Dept. of Agriculture, The University, Leeds, 2. *ent. (Life Member.)*
- 1907 COOTE, F. D., F.R.E.S., *Council*, 32, Wickham Avenue, Cheam, Surrey *l, b*.
- 1923 CORK, C. H., 11, Redesdale Street, Chelsea, London, S.W.3. *l*.
- 1919 CORNISH, G. H., 141, Kirkham Street, Plumstead Common, London, S.E.18. *l, c*.
- 1922 COUCHMAN, L. E., c/o Mrs A. Couchman, 82, Newbury Road, Bromley, Kent. *l*.
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- 1918 COURT, T. H., "Oakleigh," Market Rasen, Lincoln.
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- 1934 CRASKE, J. C. B., F.R.E.S., 33, Hinchley Drive, Hinchley Wood, Esher, Surrey. *l*.
- 1937 CRASKE, Capt. R. M., R.A., Beech Hill, Morchard Bishop, Crediton, Devon. *ent. A.F*.

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 1933 CREWDSON, R. C. R., F.R.E.S., "The Grange," Delamere, North-
 wich, Cheshire. *l*.
 1920 CROCKER, Capt. W., 55, Townley Road, Bexleyheath, Kent. *l*.
 1932 CROW, P. N., "Heathcote," Bigfrith, Cookham Dean, Berk-
 shire. *l*. *A.F.*
 1937 CURTIS, A. E., "The Cottage," Ifold Estate, Loxwood, Billings-
 hurst, Sussex. *l*.
 1927 DANBY, G. C., "Sheringham," 31, Albion Road, Sutton,
 Surrey. *l*.
 1938 DAVIES, O. C., 33, Hopton Road, Streatham, London, S.W.16. *l*.
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 1940 DAVIS, G. A., 76, Station Road, Chingford, London, E.4. *c*. *A.F.*
 1900 DAY, F. H., F.R.E.S., 26, Currock Road, Carlisle. *l*, *c*.
 1938 DEAL, JAMES, 18, Manor Road, West Wickham, Kent. *l*.
 1933 DEMUTH, Lieut. R. P., R.N.V.R., c/o Lloyds Bank, West South-
 bourne, Bournemouth. *l*. *A.F.*
 1889 DENNIS, A. W., 56, Romney Buildings, Millbank, London, S.W.1.
l, *mi*, *b*, *nat. phot.*
 1930 DENVIL, H. G., 4, Warwick Road, Coulsdon, Surrey. *l*, *c*. *A.F.*
 1901 DODS, A. W., 35, The Mall, Southgate, London, N.14. *l*.
 1921 DOLTON, H. L., 36, Chester Street, Oxford Road, Reading, Berks. *l*.
 1939 DOUBLEDAY, B. S., F.R.E.S., Monks Risborough, Aylesbury, Bucks.
Chalcidoidea.
 1936 DOUDNEY, S. P., "Thurne," 110, Foxley Lane, Purley, Surrey. *l*.
 1930 DUDERIDGE, B. J., B.A., c/o The Secretariat, Dar-es-Salaam,
 Tanganyika. *ent*.
 1927 EAGLES, T. R., *Hon. Treasurer*, 32, Abbey Road, Enfield, Middle-
 sex. *l*, *c*.
 1943 EASTMURE, D. F., "Granta," 43, Muswell Road, Muswell Hill,
 London, N.10. *l*.
 1937 EASTON, N. T., D.F.H., F.R.E.S., 214, Worcester Road, Droitwich
 Spa, Worcestershire. *l*, *e*, *nat. phot.*
 1941 EDWARDS, Rev. Canon T. G., M.A., F.Z.S., *Council*, Holy Trinity
 Vicarage, Tulse Hill, London, S.W.2. *l*.
 1933 ELGOOD, W. S., M.A., North Brink, Wisbech, Cambs. *l*.
 1937 EMBRY, B., F.R.E.S., 23, Mill Drove, Uckfield, Sussex. *l*. *A.F.*
 1932 ENNIS, L. H., c/o "Bandora," Portmore Park Road, Weybridge,
 Surrey. *l*. *A.F.*
 1935 ENSOR, G. A., "Oakleigh," Knoll Road, Dorking, Surrey. *l*
and hym.
 1920 FARMER, J. B., "Ashleigh," Beatrice Road, Oxted, Surrey. *l*, *c*.
 1924 FASSNIDGE, WM., M.A., F.R.E.S., 13, Commercial Road, Parkstone,
 Dorset. *l*, *r*, *hem*.
 1930 FERRIER, W. J., F.R.E.S., 86, Portnalls Road, Coulsdon, Surrey.
l, *A.F.*

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- 1936 FINNIGAN, W. J., 87, Wickham Avenue, Cheam, Surrey. *ent, g. phot.*
- 1943 FORD, E. B., M.A., D.Sc., The University Museum, Oxford. *l.*
- 1920 FORD, L. T., *Council*, "St Michaels," 70, Park Hill Road, Bexley, Kent. *l.*
- 1941 FORD, R. L. E., F.R.E.S., F.Z.S., "Durfold," 34, Park Hill Road, Bexley, Kent. *ent.*
- 1939 FORSTER, H. W., 76, Station Road, Chingford, London, E.4. *c.*
- 1915 FOSTER, T. B., "Downlands," 24, York Road, Selsdon, Surrey. *l.*
- 1933 FRASER, ANGUS, The Palace, Cuddesdon, Oxford. *c.*
- 1943 FRASER, G. de C., Warren Mount, Freshfield, near Liverpool. *ent.*
- 1943 FRASER, Mrs G. de C., Warren Mount, Freshfield, near Liverpool. *ent.*
- 1930 GILLIAT, F. T., B.A., F.R.E.S., Two Brewers Inn, Chipperfield, Herts. *l.*
- 1929 GLEGG, D. L., F.R.E.S., "Birchstone," Coombe Park, Kingston, Surrey. *l.*
- 1936 GOODBAN, B. S., 90, Tolcarne Drive, Pinner, Middlesex. *l.*
- 1935 GOODLIFFE, F. D., M.A., F.R.E.S., Lord Wandsworth Agricultural College, Long Sutton, Basingstoke. *ec. ent.*
- 1942 GOODSON, A. L., 26, Park Road, Tring, Herts. *l.*
- 1926 GORDON, D. J., B.A., F.R.E.S., 24, Coulson Street, London, S.W.3. *c, l.*
- 1936 GOWING-SCOPES, E., "Oakhurst," Oakwood Road, Crofton, Orpington, Kent. *l. A.F.*
- 1924 GRANT, F. T., 37, Old Road West, Gravesend, Kent. *l, c.*
- 1926 GREY, Mrs OLIVE, F.Z.S., 66, Barrington Court, Pages' Hill, London, N.10. *ent.*
- 1891 HAMM, A. H., M.A., A.L.S., F.R.E.S., 22, Southfield Road, Oxford. *l.*
- 1944 HAMMOND, H. E., 16, Elton Grove, Birmingham, 27. *l and ent.*
- 1943 HARDS, C. H., 40, Riverdale Road, Plumstead, S.E.18. *l.*
- 1902 HARE, E. J., F.R.E.S., Harrow Place, Pinden, Dartford, Kent. *l.*
- 1943 HARPER, Lieut.-Comr. G. W., R.N., Bramblewood, Bushby Avenue, Rustington, Sussex. *l. A.F.*
- 1936 HARRIS, W. H. A., 48, Corringway, London, W.5. *l.*
- 1924 HARWOOD, P., F.R.E.S., Granish Cottage, Aviemore, N.B. *l, c.*
- 1927 HAWGOOD, D. A., 2, Kingsmead Road, Tulse Hill, London, S.W.2. *l.*
- 1924 HAWKINS, C. N., F.R.E.S., *Hon. Secretary (Minuting)*, 23, Wilton Crescent, Wimbledon, London, S.W.19. *l, g.*
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- 1943 HAYNES, H., 6, Nelson Road, Salisbury, Wilts. *l.*
- 1938 HAYNES, R. F., "The Sanctuary," Burney Road, West Humble, Dorking, Surrey. *l. A.F.*

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- 1923 HAYWARD, Capt. K. J., F.R.E.S., F.Z.S., F.R.G.S., Estacion Experimental Agricola, Casilla Correo 71, Tucuman, Argentina. *l, orn, c.*
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- 1924 HENDERSON, J. L., 6, Haydn Avenue, Purley, Surrey. *c.*
- 1931 HESLOP, I. R. P., M.A., F.R.E.S., c/o Messrs Griffiths and McAlister, 10, Warwick Street, Regent Street, London, W.1. *l.*
- 1927 HEWER, H. R., M.Sc., D.I.C., Ministry of Food, Imperial Hotel, Colwyn Bay, N. Wales (Mark envelope Personal).
- 1937 HICK, E. PENTLAND, F.R.E.S., "Athol House," Fulford Road, Scarborough, Yorks. *l. A.F.*
- 1943 HOLLEBONE, Comr. L. H. T., O.B.E., R.N., 74, Kensington Court, Kensington, London, W.8.
- 1927 HOWARD, Flt. Lieut. J. O. T., M.A., R.A.F.V.R., c/o Barclays Bank Ltd., 161, New Bond Street, London, W.1. *l. A.F.*
- 1931 HOWARTH, T. G., B.E.M., F.R.E.S., 77, Woodland Rise, Muswell Hill, London, N.10. *l. A.F.*
- 1934 HUGGINS, H. C., F.R.E.S., 875, London Road, Westcliff-on-Sea, Essex. *l, ent.*
- 1929 HUGHES, ARNOLD W., Lower Farm, Quainton, Bucks. *l.*
- 1939 HULLS, L. G., F.C.S., F.R.M.S., F.R.E.S., "Rax," Chidham, near Chichester, Sussex. *ent.*
- 1938 HUMPHREYS, J. A., Woodlands Cottage, London Lane, Wyneswold, Loughborough, Leicester. *l.*
- 1933 HUTCHINGS, H. R., 127, Chadacre Road, Stoneleigh, Surrey. *l.*
- 1928 JACKSON, F. W. J., "The Pines," Ashtead, Surrey.
- 1940 JACKSON, Capt. REGINALD A., F.R.E.S., R.N., *Vice-President*, "The Hermitage," Bishops Waltham, Hants, and the Junior United Services Club, London, S.W.1. *ent, l. A.F.*
- 1923 JACOBS, S. N. A., *President*, "Ditchling," 54, Hayes Lane, Bromley, Kent. *l, e l.*
- 1924 JAMES, A. R., "Braemar," Morgan Crescent, Theydon Bois, Essex. *l.*
- 1936 JAMES, Bdr. W. H., No. 2055171, 390/27 S/L Bty., R.A., M.E.F. *l. A.F.*
- 1928 JANSON, O. J., F.R.E.S., *Recorder*, 13, Fairfax Road, Hornsey, London, N.8. *ent.*
- 1942 JAQUES, J. M., 12, Coulsdon Road, Coulsdon, Surrey. *l.*
- 1925 JARVIS, C. McK., 68, Clyfford Road, West End Road, Ruislip, Middlesex. *c.*
- 1938 JARVIS, F. V. L., B.Sc., 21, Shirley Avenue, Sutton, Surrey. *l, g. A.F.*

YEAR OF
ELECTION.

- 1923 JOHNSTONE, J. F., F.R.E.S., "Courtlands," Clarence Parade, Southsea, Hants. *l*.
- 1943 KERSHAW, Col. S. H., D.S.O., Alderman's Place, Aspley Heath, Bletchley, Bucks. *l*.
- 1928 KETTLEWELL, H. B. D., M.A., M.B., B.CHIR., M.R.C.S., L.R.C.P., F.R.E.S., "Homefield," The Common, Cranleigh, Surrey. *g, l*.
- 1910 KIDNER, A. R., "Starfell," Southdown Road, Seaford, Sussex. *l*.
- 1925 KIMMINS, D. E., R.A.F., 3, Avington Grove, Penge, London, S.E.20. *l, n. A.F.*
- 1933 KING, H., D.S.C., F.R.S., "Gavarnie," Wise Lane, Mill Hill, London, N.W.7. *l, orn.*
- 1925 LABOUCHERE, Lt.-Col. F. A., F.R.E.S., 15, Draycott Avenue, London, S.W.3.
- 1941 LAST, H. R., 12, Winkworth Road, Banstead, Surrey. *c, l*.
- 1927 LAWSON, H. B., F.R.E.S., "Churchmead," Pirbright, Surrey. *l*.
- 1914 LEEDS, H. A., Wood Walton, near Sawtrey, Huntingdon. *l*.
- 1934 LINE, H. V., 11, Priory Avenue, Petts Wood, Orpington, Kent. *l*.
- 1933 LIPSCOMB, Major C. G., Misterton, Somerset. *l. A.F.*
- 1937 LISNEY, A. A., M.A., M.B., F.R.E.S., The Red House, Narborough, Leicester. *l*.
- 1942 LLOYD, Major C. T., D.S.C., PH.D., 25, Belmont Avenue, New Malden, Surrey. *l*.
- 1935 LOWE, Major J. H. B., R.E., c/o Lloyds Bank Ltd., Cox's & King's Branch, 6, Pall Mall, London, S.W.1. *l. A.F.*
- 1931 MACNULTY, B. J., "Rutland," 67, All Saints Road, Sutton, Surrey. *l. A.F.*
- 1892 MAIN, H., B.S.C., F.R.E.S., F.Z.S., 9, Woodside Road, Woodford Wells, Essex. *l, nat. phot, c*.
- 1889 MANSBRIDGE, W., M.S.C., F.R.E.S., "Monreith," Derby Road, Formby, Liverpool, Lancs. *l, c, etc.*
- 1932 MARCON, Rev. J. N., Christ Church Vicarage, Seaside Road, Eastbourne, Sussex. *l*.
- 1930 MARSH, DUDLEY G., "Russells Farm House," St George's Lane, Hurstpierpoint, Sussex. *l*.
- 1922 MASSEE, A. M., D.S.C., F.R.E.S., East Malling Research Station, Kent. *l*.
- 1943 MATTHEWS, J. K., M.A., Greystoke, Freshfield, near Liverpool. *l, b, orn.*
- 1932 MELLOWS, W. T., M.B.E., LL.B., "The Vineyard," Minster Precincts, Peterborough, Northants. *l*.
- 1942 METCALFE, PERCY, C.V.O., R.D.I., A.R.C.A., 70, Madrid Road, Barnes, London, S.W.13. *l*.
- 1943 MILTON, P. W., 23, Woodstock Road, Carshalton, Surrey. *c, ent*.
- 1938 MINNION, W. E., 57, Lloyd Court, Pinner, Middlesex. *l. A.F.*
- 1889 MOORE, H., F.R.E.S., 9 Hoopwick Street, Deptford, London, S.E.8. *l, hem, d, e l, e hym, e d, mi.*

YEAR OF
ELECTION.

- 1920 MORISON, G. D., B.SC., PH.D., F.R.E.S., Dept. Advisory Entomology, N. of Scotland Agricultural College. Marischal College. Aberdeen, N.B. *ec. ent.*
- 1930 MORLEY, A. McD., 9, Radnor Park West, Folkestone, Kent.
- 1937 MORTIMER, D. A., 31, Junction Street, Dudley, Worcs. *hym. A.F.*
- 1940 MORTIMER, Mrs D. A., 31, Junction Street, Dudley, Worcs. *ent.*
- 1937 MOWBRAY, M. J., 80, Woodlands Avenue, Wanstead, London, E.11. *ent. A.F.*
- 1935 MULLER, Miss I. M., "Appledore," Mugswell, Chipstead, Surrey. *ent.*
- 1934 MUSGRAVE, A. J., B.SC., A.R.C.S., F.R.E.S., c/o Barclays Bank Ltd., 41, Broadway, London, W.13. *ent. A.F.*
- 1906 NEWMAN, L. W., Salisbury Road, Bexley, Kent. *l.*
- 1930 NIBLETT, M., 10, Greenway, Wallington, Surrey. *galls.*
- 1938 ODD, D. A., 11, Wickham Avenue, Cheam, Surrey. *l.*
- 1932 O'FARRELL, A. F., B.SC., A.R.C.S., F.R.E.S., "Oaklands," Old Post Office Road, Crawley, Sussex. *od, cr, ent.*
- 1934 OLIVER, G. B., Harefield Road, Luton, Beds. *l.*
- 1943 OLIVER, G. H. B., 152, Amersham Road, High Wycombe, Bucks. *l.*
- 1911 PAGE, H. E., F.R.E.S., 9, Vanbrugh Hill, Blackheath, London, S.E.3. *l.*
- 1942 PARFITT, R. W., 11, Dunsdon Avenue, Guildford, Surrey. *l.*
- 1940 PAYNE, L. G., 22, Marksbury Avenue, Richmond, Surrey. *c.*
- 1940 PAYNE, R. M., c/o 22, Marksbury Avenue, Richmond, Surrey. *c.*
- 1940 PELHAM-CLINTON, EDWARD C., R.A., Trebles Holford, Bishops Lydeard, near Taunton, Somerset. *l. A.F.*
- 1928 PERKINS, J. F., B.SC., F.R.E.S., 42, Wordsworth Road, Harpenden, Herts. *hym.*
- 1933 PEYTON, A. G., 299, Grove Road, Ramsgate, Kent. *l.*
- 1944 PICKARD, JAMES N., PH.D., M.A., F.R.S.E., 36, Storey's Way, Cambridge. *l, g.*
- 1943 PITMAN, C. M. R., "Malvern," Southampton Road, Clarendon, Salisbury, Wilts. *l, orn. b, etc.*
- 1924 PRIEST, C. G., 5, Kensal Road, Paddington, London, W.10. *l.*
- 1903 PRISKE, R. A. R., F.R.E.S., 37, Holway Road, Taunton, Somerset. *l, mo.*
- 1922 RAIT-SMITH, W., F.Z.S., F.R.E.S., F.R.H.S., "Hurstleigh," Linkfield Lane, Redhill, Surrey. *l.*
- 1942 RICHARDSON, AUSTIN, F.R.E.S., Beaudesert Park, Minchinhampton, Glos. *l.*
- 1920 RICHARDSON, A. W., F.R.E.S., 28, Avenue Road, Southall, Middlesex. *l.*
- 1936 RICHARDSON, N. A., 20, Bletchley Road, Bletchley, Bucks. *l. A.F.*

YEAR OF
ELECTION.

- 1934 RIDEOUT, J. K., "Hodgsonites," Charterhouse, Godalming, Surrey. *ent.* (*Life Member.*)
- 1908 RILEY, Capt. N. D., F.R.E.S., F.Z.S., 7, McKay Road, Wimbledon, London, S.W.20. *l.*
- 1939 RIPPON, C., M.A., J.P., F.R.E.S., *Council*, "Red Lodge," Cold Ash, Newbury, Berks. *l.*
- 1910 ROBERTSON, G. S., M.D., "Struan," Storrington, near Pulborough, Sussex. *l.*
- 1911 ROBINSON, Lady MAUDE, F.R.E.S., "Flat 15," 2, Mansfield Street, London, W.1. *l. n.*
- 1942 ROCHE, P. J. L., M.R.C.S., L.R.C.P., F.R.E.S., 8, Lansdowne Road, Bedford. *c, hem.*
- 1935 ROYFFE, D. W., 99, Hughenden Road, High Wycombe, Bucks. *c, ent.* *A.F.*
- 1932 RUDLAND, W. L., F.R.E.S., 211, Caversham Rd., Reading, Berks. *l.*
- 1932 RUSSELL, A. G. B., M.V.O., F.R.E.S., Lancaster Herald, "Windy Walls," Gatehouse of Fleet, S.W. Scotland. *l.*
- 1915 RUSSELL, S. G. CASTLE, "Springetts," Seaview Road, Highcliff-on-Sea, Hants. *l.*
- 1908 ST AUBYN, Capt J. G., F.R.E.S., 14, Purley Knoll, Purley, Surrey.
- 1927 SCOTT, Col. E., M.B., "Hayesbank," Ashford, Kent. *l. A.F.*
- 1923 SEVASTOPULO, D. G., F.R.E.S., c/o Ralli Bros., Ltd., Calcutta. (*Life Member.*) *l.*
- 1933 SHARMAN, F. W., 183, Star Road, Peterborough, Northants. *l.*
- 1938 SHERRIN, W. R., A.L.S., F.Z.S., South London Botanical Institute, 323, Norwood Road, Herne Hill, London, S.E.24 *c, l.*
- 1939 SIVITER SMITH, P., F.R.E.S., "Squirrels," Little Aston Park, Streetly, Staffs. *l.*
- 1921 SMART, Major H. D., M.C., M.D., B.S., F.R.E.S., 26, Snakes Lane, Woodford Green, Essex. *l.*
- 1941 SMITH, Lieut. FDK. WM., R.N.V.R., "High Mains," Closeburn, Dumfries. *l, hym.* *A.F.*
- 1939 SMITH, S. GORDON, F.L.S., F.R.E.S., "Estyn," Boughton, Chester. *ent.*
- 1938 SNELL, B. B., "Woodsome," Bromborough, Cheshire. *l. A.F.*
- 1941 SPARROW, R. W., *Council*, 134, Regents Park Road, London, N.3. *l.*
- 1943 SPREADBURY, W. H., 35, Acacia Grove, New Malden, Surrey.
- 1938 STAFFORD, A. E., "Corydonis," 83, Colborne Way, Worcester Park, Surrey. *l.*
- 1927 STANLEY-SMITH, F., F.R.E.S., *Hon. Secretary (Corresponding)*, "Hatch House," Pilgrim's Hatch, near Brentwood, Essex. *l.*
- 1928 STANLEY-SMITH, Mrs MAUD, *Council*, "Hatch House," Pilgrim's Hatch, near Brentwood, Essex. *l.*
- 1937 STEDALL, H. P. P., "Cherry Cottage," Prestwood, Great Missenden, Bucks. *ent.*

YEAR OF
ELECTION.

- 1940 STEEL, W. O., 16, Upsdell Avenue, Palmers Green, London, N.13. *c.*
- 1935 STEPHENS, J. A., F.R.E.S., 44, Mount Road, Chatham, Kent. *c.*
- 1938 STERLING, D. H., 36, Estella Avenue, New Malden, Surrey. *l. A.F.*
- 1942 STIDSTON, Eng. Capt. S. T., F.R.E.S., R.N., 1, Palace House, Bayswater Road, London, W.2, and "Ashe," Ashburton, Devon. *l. A.F.*
- 1936 STIGANT, Miss B., 22, Brock Street, Bath, Somerset. *hortic. ent.*
- 1924 STOREY, W. H., c/o Barclays Bank, High Street, Shoreditch, London, E.1. *ent. A.F.*
- 1931 STOVIN, G. H. T., M.R.C.S., L.R.C.P., 36, Wymondley Road, Hitchin, Herts.
- 1929 STUBBS, G. C.
- 1939 SUMMERS, E. J., 7, Cavendish Road, Sutton, Surrey. *c, hem.*
- 1934 SUTTON, GRESHAM R., 6, Kenilworth Gardens, Loughton, Essex. *l, c.*
- 1943 SWANN, E. L., 282, Wootton Road, King's Lynn, Norfolk. *c.*
- 1916 SYMS, E. E., F.R.E.S., F.Z.S., *Hon. Librarian*, 22, Woodlands Avenue, Wanstead, London, E.11. *n, orth, od, t.*
- 1942 TALBOT, M. J. R., c/o The Foreign Office, S.W.1. "By Angora Bag." *l.*
- 1922 TAMS, W. H. T., F.R.E.S., 20, Ranelagh Avenue, Fulham, London, S.W.6. *l.*
- 1913 TATCHELL, L. S., F.R.E.S., "Rockleigh Cottage," Swanage, Dorset. *l.*
- 1941 TAYLOR, H. G. W., 11, Granville Road, Sidcup, Kent. *c.*
- 1934 TAYLOR, J. O., 176, Petts Wood Road, Petts Wood, Kent. *l.*
- 1925 TAYLOR, J. SNEYD, M.A., F.R.E.S., P.O. Box 45, Graaff-Reinet, Cape Province, Union of S.A. *l.*
- 1938 TETLEY, J., "White Cottage," Silverlea Gardens, Horley, Surrey. *ent.*
- 1935 TOMPKINS, F. H., "Clifton," 18, Forest Side, Worcester Park, Surrey. *ent.*
- 1937 TONGE, A. E., F.R.E.S., "Ashville," Trafford Road, Alderley Edge, Cheshire. *l.*
- 1934 TUNSTALL, H. G., 11, St James Avenue, Ewell, Surrey. *l.*
- 1940 TURNER, A. D., 19, Wychwood Close, Canon's Park, Middlesex. *ent.*
- 1943 TURNER, J. FINCHAM, 17, Litchfield Avenue, Morden, Surrey. *l, hym.*
- 1943 VESEY-FITZGERALD, BRIAN, F.R.E.S., F.L.S., M.B.O.U., Red Rise, Burley, near Ringwood, Hants. *ent, orn.*
- 1889 WAINWRIGHT, C. J., F.R.E.S., 172, Hamstead Road, Handsworth, Birmingham. *l, d.*
- 1929 WAINWRIGHT, J. CHAS., 9, Priory Road, Hook Road, Surbiton, Surrey. *l.*

YEAR OF
ELECTION.

- 1911 WAKELY, Sir LEONARD D., K.C.I.E., C.B., 8, Cottenham Park Road, Wimbledon, London, S.W.20. *l.*
- 1930 WAKELY, S., *Council*, 17, Warminster Road, S. Norwood, London, S.E.25. *l.*
- 1935 WALLIS-NORTON, Capt. S. G., R.A.S.C., Roche Court, Fareham, Hants. (*Life Member*). *ent. A.F.*
- 1944 WALTON, ANTHONY M., 275, Croxted Road, West Dulwich, London, S.E.21, and Hertford College, Oxford. *l.*
- 1936 WARRIER, R. E., "Birchwood," Birchwood Park Avenue, Swanley, Kent. *l.*
- 1939 WATKINS, Lieut. N. A., M.A., F.R.E.S., R.N.V.R., Belcombe Court, Bradford-on-Avon, Wilts. *l. A.F.*
- 1920 WATSON, D., "Crossways," Hightown, Ringwood, Hants. *l.*
- 1928 WELLS, CLIFFORD, "Dial House," Crowthorne, Berks. *l.*
- 1911 WELLS, H. O., "Linden House Hotel," 9 College Road, Epsom, Surrey. *l.*
- 1937 WELTI, A., F.R.E.S., "Foxbush," Tillingdown Lane, Caterham, Surrey. *l.*
- 1911 WHEELER, The Rev. G., M.A., F.Z.S., F.R.E.S., "Ellesmere," Gratwicke Road, Worthing. Sussex. *l.*
- 1927 WHITE, A. GRANVILLE, "Hilltop," Chaldon, Surrey.
- 1925 WILLIAMS H. B., LL.D., F.R.E.S., "Croft Point," Bramley, Surrey. *l.*
- 1932 WILLIAMS, S. W. C., *Council*, 17, Beresford Road, Chingford, London, E.4. *l, g.*
- 1938 WILLIS, J. R., "Vine Cottage," West Horsley, Surrey. *l. A.F.*
- 1918 WOOD, H., "Albert Villa," Kennington, near Ashford, Kent. *l.*
- 1926 WOOTTON, W. J., "Wannock Gardens," Polegate, Sussex. *l.*
- 1927 WORMS, The BARON DE, M.A., PH.D., F.R.E.S., M.B.O.U., F.C.S., A.I.C., 12, Harcourt Terrace, Salisbury, Wilts. *l, orn.*

Members will greatly oblige by informing either of the Hon. Secretaries of any errors in, additions to, or alterations required in the above addresses and descriptions. [*g*, genetics added.]

REPORT OF THE COUNCIL FOR 1943.

The close of its 72nd year finds the Society still in an active and reasonably prosperous condition despite the war, with its restriction on many of our normal forms of activity.

As compared with 259 a year before, at 31st December our numbers amounted to the record figure of 268, made up of 4 Honorary, 4 Life, 199 Full and 61 Country members. During the year there were 8 deaths, and 5 members resigned, while 22 new members were admitted. Your Council nominated Mr F. W. Frohawk as an Honorary Member in July, and Mr W. C. Sheldon in November, both in recognition of their eminent services to entomology in the past. 49 members are known to be serving with the Armed Forces. Your Council regrets that during the year Mr W. H. Storey was taken a prisoner of war by the Japanese. No other casualties have been reported.

In addition to the Exhibition and Annual Meetings, 11 Ordinary meetings have been held, at which papers have been read by Messrs Sparrow and Rippon, Captain Jackson, Messrs Niblett, Syms and Jarvis, and Dr Kettlewell. The average attendance was 33. The lantern was in use on three occasions.

The Annual Exhibition in October was again highly successful. The provision of light refreshments was an improvement which enabled visitors to complete their inspection of the exhibits in comfort, and the assistance of the lady waitresses was much appreciated. The recorded attendance was 185.

Field Meetings were held during the season at Bookham (2), Chipstead, Horsley, Scratch Wood, Oxshott, Ashted (3), Boxhill and Effingham, finishing with a fungus foray led by Messrs Spreadbury and Finnigan at Ashted.

In order to improve and augment the library more rapidly, your Council resolved that a definite sum should be transferred to the Library Fund at the beginning of each year, to be at the disposal of the Librarian. For 1943 this transfer was fixed at 1/- for each subscribing member.

Our relations with the Chapter House authorities continue to be most friendly; the services of Mr Frampton, the head Verger of the Cathedral, and his assistants in making tea for us at the Exhibition were very much appreciated.

The *Proceedings and Transactions* for 1942/43 were published in two parts, Part I consisting of a paper by Dr Kettlewell, with 2 coloured and 3 black-and-white plates.

During the year Mr H. A. Leeds completed and handed over to the Society his manuscript in duplicate, describing the varieties of the three British Satyrids, *Maniola tithonus*, *M. jurtina*, and *Coenonympha pam-*

philus, which he presented last year. It is regretted that exigencies of the time prevent publication at present.

The Curator completed his "labours of Sisyphus" by re-arranging the last of the typical collections; he is to be congratulated on the splendid result of his systematic work extended over many years. The Society benefits greatly from the ease with which any required insect can now be traced.

Our former member, Mr E. Ernest Green, has very kindly presented to the Society his collection of British *Tortricidae*. Their embodiment in our collection will cause our Curator to restart his labours.

The Curator reports that insects have also been presented to the Society during the year by Messrs R. J. Burton, Dennis, Denvil, Grant and Kimmins. The thanks of the Society are hereby accorded to the donors.

The Librarian reports that there has been a large increase in the number of books borrowed during the year. Many of our Country members have taken advantage of the Council's offer to send books by post.

During the year the card index of bound books has been revised and brought up to date.

ADDITIONS TO LIBRARY, 1943-1944.

Donations.—By Mr H. W. Andrews:—A Separate of his paper in *Entomologist's Record*, "British Dipterological Literature." By Mr R. J. Collins:—Kane's *Handbook of European Butterflies*, 1885; Stainton's *Insecta Britannica*, Vol. iii, Lepidoptera, Tineina, 1854. By Mr A. W. Dennis:—Merrin's *Lepidopterist's Calendar; and Episodes of Insect Life*, by Acheta Domestica, 1867 (Revised by Rev. J. G. Wood). By Capt. K. J. Hayward (of Argentina):—A number of Economic Separates. By Mr G. D. Morrison:—A number of Separates dealing mainly with the Honey-bee on Farm Pests. By Mr M. Niblett:—A Separate (2 copies) of his paper in *The Entomologist*, "The Species of Rhodites causing Pea-Galls on Rosa." By Mr W. H. Spreadbury:—Moggeridge's *Harvesting Ants and Spiders*, and Curtis's *British Beetles. Report of the Smithsonian Institution*, 1941.

By Purchase or Exchange.—Wingate's List of Durham Diptera, *Trans. Nat. Hist. Soc. of Northumberland, Durham and Newcastle-upon-Tyne*, Vol. ii, 1906 (new series), with 7 plates. *Norfolk and Norwich Naturalists Soc. Trans.*, Vol. xv, Pt. iv, January 1943. *South Eastern Naturalist and Antiquary*, being Proc. and Trans. of the S.E.U.S.S. for 1942. *Isle of Wight Nat. Hist. and Arch. Soc. Proc.*, 1942. *Wisconsin Academy of Science Trans.*, Vol. xxxiv, 1942. *Ent. Soc. Brit. Columbia Proc.*, Vol. 43. *The Wood Pigeon Bulletin*, January and April 1943. *The Entomologist*, 1943. *Entomologist's Monthly Magazine*, 1943. *Entomological News*, 1942-43. *Entomologist's Record*, 1943. *Lloydia*, December 1942 and March 1943. *Essex Naturalist*, 1942 to 1943. *Proceedings of the Royal Irish Academy*, Sec. B., 1942 to 1943.

HON. TREASURER'S REPORT, 1943.

This year the outstanding feature of the accounts on the expenditure side is the large amount we have spent on our annual publication. The total cost of the two parts was no less than £183 4s 6d, of which £125 18s appears against the Publication Fund and £57 6s 6d against the Illustrations Fund. Such a heavy outlay was made possible by the receipt of three large donations. Dr Kettlewell contributed £15 towards the cost of the *Panaxia dominula* plates. For the eighth successive year an anonymous friend gave us £20 for the Illustrations Fund. The third of this year's large donations came at a moment of acute anxiety for your Council when it seemed we should have to curtail severely Part II of the 1942/43 *Proceedings and Transactions*. It was at this critical juncture that a member, who wishes to remain anonymous, came to me with a donation of £50. In Part II you will find a detailed report of the Annual Exhibition of October 1942. This was, by courtesy of the Editors, reprinted from the *Entomologist's Record and Journal of Variation*. Mr Hy. J. Turner generously bore the cost. Nor is this all, for there are many who have given donations to the Publications Fund and to the Subscriptions Account. To all these staunch friends the heartiest thanks of the Society are due. I hope there will be an increase in the number of those who make a small addition to their annual subscription to help the Publication Fund and the Subscription Account.

Despite all this the great effort the Society has made in 1943 has obliged us to draw on the accumulated surplus of past years to the extent of £9 4s 7d.

Once again I thank the members for their kindly help to me as Treasurer.

During the year an improved form of Bankers' Order was prepared and distributed by our Corresponding Secretary. I am pleased to say there has been a gratifying increase in the number of members using this most convenient method of payment.

BALANCE SHEET.

Our investments are unchanged. Their market value at 31st December 1943 was £1200. Our cash resources were about £20 less than a year ago.

INCOME AND EXPENDITURE ACCOUNT.

The subscription income at £129 3s was up by £5 and the grant to the Publication Fund at £62 was £8 less. This gain of £13 is offset by two new items of expenditure, namely, £3 11s 9d for Advertising and £10 transferred to the Library Fund. Postages and stationery are up and investment income is reduced because of increased Income Tax.

The final result is, as already stated, an excess of expenditure over income of £9 4s 7d.

CAPITAL ACCOUNT.

The receipts from Entrance Fees were £2 12s 6d. This is the largest amount since 1938: a very encouraging sign.

LIBRARY FUND.

A grant of £10 was made to this Fund to enable the Librarian to improve the Library as opportunity arises. Very little was spent in the year, and there was at the end £13 16s 1d in hand.

PUBLICATION FUND.

Here you will find the heavily increased charge for printing the *Proceedings and Transactions*. The amount is £125 18s. On the other side you will find £52 9s received from generous donors. This £125 18s does not include anything for the Plates. The whole cost of these, that is to say the making of the blocks and the printing from them, is charged to the Illustrations Fund.

ILLUSTRATIONS FUND.

This benefited by an anonymous donation of £20 and by a contribution of £15 from Dr Kettlewell. The blocks and printing cost £57 6s 6d, bringing the balance in hand down to £22 11s 5d.

Thus we have had a year of great activity and correspondingly heavy expense. Bearing in mind what has been done, we have, I feel sure you will agree, much to be thankful for.

War conditions delayed the appearance of Part II, with the result that I have only very recently received the bills and closed the accounts. There has not been time to arrange the audit, but Messrs Coulson and S. W. C. Williams have kindly promised to carry it out shortly.

T. R. EAGLES.

Note.—The accounts were subsequently examined and found correct.

INCOME AND EXPENDITURE ACCOUNT—Year to 31st December 1943.

Rent of Rooms ...	...	...	...	£50 0 0	Subscriptions (Arrears and Current) ...	...	...	£129 3 0
Insurance ...	...	...	...	1 5 9	Interest—	...	...
Gratuities, Cleaning, etc. ...	...	...	...	2 0 0	£154 14s 0d 4% Consols ...	...	...	£6 3 8
Secretarial Expenses ...	...	...	...	16 5 4	£591 15s 3d 3½% Conversion Stock ...	...	...	20 14 2
Treasurer's Expenses ...	...	...	...	5 19 4	£100 0s 0d 3% Defence Bonds ...	...	...	3 0 0
					Deposit Interest ...	...	...	1 7 9
Subscriptions to South Eastern Union of Scientific Societies, Wicken Fen Fund, Footpaths Preservation Society, and Ramblers' Association	...	...	...	£75 10 5				
Advertising ...	...	...	...	2 14 0	Less Income Tax ...	...	...	£31 5 7
Grant to Publication Fund ...	...	...	...	3 11 9				15 17 0
Grant to Library Fund ...	...	...	...	62 0 0	Balance being Excess of Expenditure over Income carried to Balance Sheet ...	...	...	15 8 7
				10 0 0				9 4 7
				£153 16 2				£153 16 2

xi.

CAPITAL ACCOUNT—Year to 31st December 1943.

Transfer to Library Fund ...	...	...	...	£2 12 6	Balance at 1st January 1943	...	...	£1084 5 11
Balance at 31st December 1943	...	...	...	1084 5 11	Entrance Fees ...	...	...	2 12 6
				£1086 18 5				£1086 18 5

LIBRARY FUND—Year to 31st December 1943.

[illegible]

PUBLICATION FUND—Year to 31st December 1943.

Printing and Posting <i>Proceedings and Transactions</i>	£125 18 0	Balance at 1st January 1943	£2 13 0
Purchase of extra copies of <i>Panaria dominula</i> plates	0 10 0	Sales of <i>Proceedings</i>	6 6 4
Balance at 31st December 1943	2 5 4	Donations	52 9 0
		Interest on 3½ % War Stock (Misses E. F. and L. M. Chapman) £10 10s, less Income Tax £5 5s	5 5 0
		Grant from Income and Expenditure Account	62 0 0
	£193 13 4		£128 13 4

ILLUSTRATIONS FUND—Year to 31st December 1943.

[illegible]

ABSTRACT OF PROCEEDINGS.

13th FEBRUARY 1943.

The PRESIDENT, Mr R. J. Burton, L.D.S., R.C.S.Eng., in the Chair.

The following appointments by the new Council of further Officers and of Committees of the Society for the current year, were announced :

Assistant Secretary: Indoor Meetings—Mr E. E. Syms, F.R.E.S.

Assistant Secretary: Field Meetings—Mr F. D. Coote, F.R.E.S.

Assistant Editor—Mr C. N. Hawkins, F.R.E.S.

Recorder of Attendance—Mr O. J. Janson, F.R.E.S.

Lanternist—Mr J. H. Adkin.

Committees: *Publication*—Messrs Hy. J. Turner, F.R.E.S., F.R.H.S.; O. N. Hawkins, F.R.E.S.; Dr K. G. Blair, F.R.E.S.

Library—The President (Mr R. J. Burton, L.D.S., R.C.S.Eng.), and Messrs S. Wakely; E. E. Syms, F.R.E.S.; S. R. Ashby, F.R.E.S.; F. J. Coulson; F. D. Coote, F.R.E.S.; and F. Stanley Smith, F.R.E.S.

Capt. W. CROCKER exhibited a specimen of *Brenthis selene*, Schiff., taken in N. Devon last year, which appeared to have lead-coloured spots on the underside of all wings. This is probably due to defective scaling.

Mr R. W. SPARROW showed a drawer of Microlepidoptera and sketches of larvae and read a paper, "Beginner's Notes on Microlepidoptera."

Dr G. V. BULL read the following "Sandhurst Notes for 1942":—"The season was again late and cold. The first capture of the year was a larva of *Arctia villica*, L., crawling over the snow on 8th February. My Sallow did not show yellow catkins till 1st April, and the first *Taenio-campids* were *Orthosia* (*Taeniocampa*) *stabilis*, Schiff.; *incerta*, Hufn., and *gothica*, L., on 6th April. *Euchloë cardamines*, L., appeared on 12th April, and *Pieris rapae*, L., on 16th April. All "Whites" were fairly plentiful, but *Polyommatus icarus*, Rott. (19th May), and *Lycaena* (*Heodes*) *phlaeas*, L. (15th May), were scarce. This year *Erynnis* (*Hesperia*) *tages*, L., was out before *Pyrgus* (*Hesperia*) *malvae*, L., which is quite unusual. *Brenthis euphrosyne*, L., was seen on 16th May—well up to date. No moths were taken on garden sugar till 3rd July when one *Apatele* (*Acronicta*) *psi*, L., was noted. Immigrants were scarce in the neighbourhood. No *Vanessa* (*Pyrameis*) *cardui*, L., or *Colias croceus*, Fourc., appeared, and no *Acherontia* (*Manduca*) *atropos*, L., were reported from local potato crops as in 1941."

13th MARCH 1943.

Mr S. WAKELY, Vice-President, in the Chair.

Messrs Charles Martin Roy Pitman, of "Malvern," Southampton Road, Clarendon, Salisbury, Wilts, and John Fincham Turner, of 17 Lichfield Avenue, Morden, Surrey, were declared elected Members.

Canon EDWARDS exhibited the following varieties of British Lepidoptera from the Burnt Wood district of N. Staffs.:—*Peridroma porphyrea*, Schiff. (*sauzia*, Hb.), var. *margaritosa*, Haworth; the grey form of *Panolis flammea*, Schiff. (*piniperda*, Panz.); *Erannis leucophearia*, Schiff., var. *marmorinaria*, Esp.; and an extreme *sub-roseata*, Woodforde, form of *Cosymbia pendularia*, Clerck.

The BARON DE WORMS exhibited ova of *Oria musculosa*, Hb., and said that Dr Hobby reports that some which he has are just hatching.

Mr H. R. LAST showed larvae of the Coleopteron, *Endomychus coccineus*, Linn., from Banstead, taken on 21.ii.43, and Mr Syms reported that they were common in Epping Forest, but that some 300-400 larvae produced three beetles only. Mr Hugh Main had a similar result, the mortality being due to a Chalcid parasite (*Endomychobius endomychi*, Walk.).

Mr C. RIPPON then showed a fine series of Lantern Slides, in colour, of various Entomological subjects, living imagines, larvae, etc., in natural conditions. A hearty vote of thanks was proposed from the Chair and carried by acclamation.

10th APRIL 1943.

The PRESIDENT in the Chair.

The death of Mr L. O. Grocock on the 3rd instant was announced, also that of a well-known non-member, Mr F. N. Pierce, who died very recently.

Mr F. T. GRANT exhibited a Coleopteron new to the South of England, *Otiorrhynchus porcatus*, Hbst., taken on a stone (burr) of a rockery in his garden at Gravesend on 12th April 1942, and read the following note on its previous recorded distribution:—"Donisthorpe in his *Annotated List of the Additions to the British Coleopterous Fauna* says it has been taken in Meath and Dublin, Ireland, and Oxford in England only. Dr Joy says very local, Oxford, Durham, and Ireland."

Mr EAGLES exhibited the lichen, *Peltigera canina*, Willd., said to be a foodplant of the larva of *Comacla senex*, Hb.; also larvae of *Lasio-campa quercus*, L., from the Lancashire sandhills, and *Pammene argyrana*, Hüb., from Epping.

Mr SPARROW exhibited the Microlepidopteron, *Mompha subbistrigella*, Haw., and young larvae and larval houses of *Plusia moneta*, Fab.

Mr J. FINCHAM TURNER exhibited several species of Spring Insects from various localities, Hymenoptera, Lepidoptera, etc.

Mr J. A. STEPHENS exhibited the following rare or local Coleoptera, mostly taken at Chatham or Cobham within the last few months:—*Quedius scitus*, Gr., taken at Cobham Park on 16.ix.42; *Lathrobium elongatum*, L., var. *fraudulentum*, Gang., taken at Chatham in straw, 13.xi.42; *Euplectus punctatus*, Muls., taken at Much-Hadham, Herts., under bark of dead Poplar tree, 14.ix.42, confined to the Midlands and North; *Cryptophagus ruficornis*, Steph., taken in rotten boughs of dead

Ash in Cobham Park, 19.vi.42 (note habitat); *Geotrupes typhaeus*, L., taken in Cobham Park in fresh horse manure, 23.x.42, in plenty (note habitat); *Liodes calcarata*, Er., taken in leaves, Chatham, 4.ii.43; *Orobitis cyaneus*, L., taken in leaves, Chatham, 17.ii.43 and 24.iii.43 (local, never abundant); *Ceuthorhynchus picitarsis*, Gyll., taken at Chatham on 18.viii.42, on Horse Radish; *Phytobius quadrinodosus*, Gyll. (*denticollis*, Gyll.), taken in straw at Chatham on 17.ii.43. Some discussion followed as to habits and localities for some of Mr Stephens's species in which Messrs Coulson, Syms, Wakely and others took part.

Mr SYMS remarked on the egg-laying of *Blaps mucronata*, Lat., and enquired for information as to the food of the young larvae. Mr Stephens suggested grains of corn, etc.

A note from Dr G. V. BULL was then read, giving some records of first observations in his locality for this year, viz.:—*Euchloë cardamines*, L., 3rd April, the earliest for 10 years; *Pieris rapae*, L., 5th April, earliest since 1938; and the plant "Jack-by-the-Hedge" (*Sisymbrium officinale*, Scop.) in bloom on 4th April.

Mr HY. J. TURNER reported finding a specimen of *Gonodontis bidentata*, Cl., on 2nd April this year.

13th MAY 1943.

The PRESIDENT in the Chair.

The death of Mr Alfred Sich, F.R.E.S., on the 27th April last was announced. He was in his 85th year and had been a member of this Society for some 45 years.

Mr HY. J. TURNER exhibited a number of British and Continental specimens of the Agrotid moth, *Anaplectoides* (= *Eurois*) *prasina*, Schiff., and drew attention to the great variation in the extent of the dark markings and to the extremely fugitive nature of the green coloration, and suggested that our British form should be known as subsp. *mixta*, Haw.

Col. P. A. CARDEW exhibited insects taken on Wimbledon Common in recent years, including *Tethea duplaris*, L.; *Achlya flavicornis*, L.; *Parastichtis suspecta*, Hb.; and minor aberrations of *Mesoleuca albicillata*, L., *Boarmia roboraria*, Schiff., and *B. punctinalis*, Scop. (= *con-sortaria*, Hb.).

Mr T. R. EAGLES exhibited (1) a gall on Juniper caused by the fungus *Gymnosporangium clavariaeforme*, DC., and (2) the Cabbage-root Fly, *Hylemyia brassicae*, L.

Mr V. E. AUGUST showed larvae of *Comibaena pustulata*, Hufn., found on oak in N.W. Sussex, and drew attention to the way in which the larva covers itself with pieces of leaf as camouflage.

Mr C. N. HAWKINS exhibited two specimens of the Coleopteron *Rhizophagus parallellocollis*, Gyll., taken at Wimbledon on 16.iv.1943, flying in evening sunshine in his garden. He mentioned that this beetle is often associated with dead bodies, being frequently found in graveyards and similar places, but that it has also been recorded from rotting

seed potatoes, etc. Recent accounts of its habits and habitats may be found in the *E.M.M.* at the following places:—42, 1906, p. 256; 43, 1907, p. 3; 44, 1908, p. 40; and notably in an article by Dr K. G. Blair, 58, 1922, p. 80.

A note from Dr G. V. BULL was read reporting that he had bred two male specimens of *Minucia lunaris*, Schiff., on 14th and 27th April this year from three larvae he had beaten from Oak near his home at the end of July last year. The third larva was parasitized. This is believed to be the first record of this larva in Britain. Dr Bull also reported *Brenthia euphrosyne*, L., on 27th April, the earliest date in 15 years he had been at Sandhurst.

Capt. R. A. JACKSON, R.N., read the following note on "Delayed Emergence of *Acosmetia caliginosa*, Hb.": "In early June 1941 I secured ova from wild females of *Acosmetia caliginosa*, from South Hampshire, the larvae feeding up readily and pupating early in August. The resultant imagines from these pupae appeared at the beginning of June 1942, the females emerging two or three days before the males. I had some *Craniophora (Acronicta) ligustri*, Schiff., in the same cage last Autumn, and am now watching for their emergence. On Monday, 10th May, I found a female *caliginosa* newly emerged, and a second came out on 11th May. I anticipate a good many more will emerge as I was disappointed at the small number I bred last year. I have not heard of this species lying over before, and I wonder whether, if this is a normal occurrence, it is an explanation of the remarkable discrepancy in the dates between the time of emergence in South Hampshire and the dates given in the text book referred to by Baron de Worms in his note published on page 211 of the September *Entomologist* for 1941. He points out that the date in the text books for this insect is July, whereas we get it at the very beginning of June. It seems possible to me, therefore, that the early insects may have been two years in the pupal stage, and that the insect may also occur in July after only one year in pupa."

Mr C. RIPPON then read his very interesting paper on "The Rearing of Lepidoptera." (See *Trans.*)

10th JUNE 1943.

The PRESIDENT in the Chair.

The death of a former member, Mr H. Worsley Wood, at Cambridge in the early part of last month, was announced.

Capt. R. A. JACKSON, R.N., exhibited an empty cocoon of *Apoda avellana*, L. (= *Limacodes testudo*, Schiff.) and drew attention to the method of escape of the imago by lifting a kind of "lid" at the end of the cocoon. He also reported a considerable immigration of *Celerio livornica*, Esp., recently.

Dr K. G. BLAIR, at the request of Mr T. R. Eagles, exhibited the Anthomyiid fly *Hylephila obtusa*, Zett., observed by Mr Eagles shadowing the bee *Andrena fulva*, Schrk., in his garden at Enfield. The fly was not

actually seen to enter the burrows of the bee but would settle on the ground close by. Collin (1921, *Trans. Ent. Soc. Lond.*, 1920, p. 316) also reports that the females were in numbers "round the burrows of *Andrena fulva*, at Primrose Hill." The allied species, *H. personata*, Coll., has been observed to enter the burrows of *A. labialis*, Kby., presumably for the purpose of depositing its eggs. With these were exhibited various species of Tachinid flies that behave in a very similar manner with regard to other ground-nesting Hymenoptera, including *Miltogramma punctata*, Mg., once found plentifully in the nests of *Colletes daviesana*, Smith (stored with pollen); *Metopia leucocephala*, Rossi, found with *Ammophila sabulosa*, L., at Oxshott (prey, Noctuid caterpillars), and with *Crabro peltarius*, Schrk., in Cumberland (prey, Diptera); *Setulia grisea*, Mg., with *Cerceris arenaria*, L., at Woking (prey, *Otiorrhynchus* weevils) and *Sphecapata conica*, Fall., with *Crossocerus anxius*, Wesm. (prey recorded as small Empidae) at Aviemore. Of these, *Metopia leucocephala* has been observed to pounce upon a booty-laden female of the wasp outside her burrow and lay an egg upon the booty and so secure access for her progeny to the nest. The Tachinidae are a parasitic group of Diptera, but whether the larvae in these cases would feed upon the still living but paralyzed victims of the wasp and starve out the wasp larva or whether the wasp larva itself is the prey of the Dipteron is not evident. From the diversity of the provender stored by these Hymenoptera one would expect that it is the larva of the latter that forms the prey of these closely allied parasites. The Anthomyiidae, on the other hand, are in the main feeders upon rotting vegetable and animal matter and in the case of *Hylephila* feed probably upon the pollen mass stored up by the bee for its own offspring and thus play the part of veritable cuckoos. Dr Blair also exhibited the solitary wasp, *Odynerus* (*Ancistrocerus*) *pictus*, Curt., reared from the cells formed in the holes of the cribbage-board exhibited at the meeting last September; six wasps had so far emerged, all males.

Major H. S. FREMLIN exhibited specimens of the plant "Herb Paris," *Paris quadrifolia*, L., from a locality in Kent where, he said, it grew in profusion. One of the examples shown was of the normal four-leaved form but the other had six leaves.

Mr T. R. EAGLES exhibited larvae of *Amphixyrra tragopoginis*, L.; the hygroscopic seeds of the plant *Erodium gruinum*, Soland.; a female of the large Ichneumon, *Rhyssa persuasoria*, L., taken at Scratch Wood Field Meeting, and imagines of the Narcissus-bulb fly, *Merodon equestris*, F.

Mr H. R. LAST exhibited the following Coleoptera:—(1) *Chrysomela fastuosa*, Scop., swept from Dead-nettle in Leicestershire, and said that ova were laid 29th April onwards, white in colour, cigar-shaped, the surface fairly evenly reticulate. Approximately 1.5 mm. long by .5 mm. diameter. Laid singly in horizontal position on surface of leaf. 12th May, larvae commenced hatching. Fed on Dead-nettle. 6th June, larvae entered the earth for pupation. (2) *Endomychus coccineus*, L.,

and reported that the larvae exhibited on 13th March last turned to pale pink pupae on 2nd May. On 20th May the beetles emerged but no pupal skins were found. (3) *Anoncodes melanura*, L., and said "We have heard a lot about these beetles from time to time. I found these four specimens around the Tower Hill district of the City on Monday, 7th June—one on the wing. I saw quite half-a-dozen more that had been trodden upon." [See *E.M.M.*, 72 (1936), pp. 15, 41.]

The BARON DE WORMS exhibited a full-fed larva and a cocoon of *Parascotia fuliginaria*, L., obtained in the Chobham district of Surrey, and drew attention to the way in which the cocoon is hung like a hammock by threads at each end. He also showed ova of *Celerio livornica*, Esp., obtained from a specimen taken near Salisbury on 30th May 1943.

A note from Dr G. V. BULL was read, reporting, on the authority of Col. Kershaw, that an immigration of *Celerio livornica*, Esp., and *Heliothis dipsacea*, L., had occurred at Crackington Haven on 29th May. Col. Kershaw also reported swarms of *Vanessa cardui*, L., and *Plusia gamma*, L., and 20 *Macroglossum stellatarum*, L.

Mr M. NIBLETT reported a plant of Goat's Beard, *Tragopogon*, perhaps *porrifolius*, L., with purple flowers; all other plants in the neighbourhood had yellow flowers as usual.

Capt. R. A. JACKSON, R.N., then read a most interesting paper "Notes on the Sesiidae." (See *Trans.*) After some discussion, a hearty vote of thanks was moved from the chair and carried by acclamation.

8th JULY 1943.

The PRESIDENT in the Chair.

The death of Mr A. Ford of Bournemouth on 30th May last was announced. It was also announced that Mr F. W. Frohawk had been nominated by the Council as an Honorary Member of the Society in recognition of his great services to Entomology, in accordance with Bye-Law 8.

The following new Members were declared elected to the Society:—Messrs Robert John Cousins, A.C.P., M.R.S.T., F.Z.S., of Lane End, Westmill, Buntingford, Herts.; Denis Frank Eastmure, of "Granta," 43 Muswell Road, Muswell Hill, N.10; and Eric Lister Swann, of 282 Wootton Road, Kings Lynn, Norfolk.

Mr M. NIBLETT exhibited Galls, Gall-wasps, and Parasites of *Rhodites rosae*, L., *R. eglanteriae*, Htg., *R. spinosissimae*, Gir., *R. mayri*, Schl., and *R. dispar*, Niblett, in connection with his paper subsequently read.

Mr W. J. FINNIGAN exhibited the cocoon of *Cerura furcula*, L. (Sallow Kitten), formed by a larva obtained at the recent Oxshott Field Meeting, and larvae of *C. bifida*, Hb. (Poplar Kitten), also obtained at the same meeting.

Mr S. WAKELY exhibited larvae of *Celerio livornica*, Esp., bred from ova obtained by Lt.-Col. W. G. B. Hawley, D.S.O., of Salisbury, and remarked that they were feeding on Dock, the small-flowering Tree

Fuchsia, and Virginia Creeper (*Ampelopsis veitchii*, Hort.). He also showed a larva (nearly full fed) of *Stauropus fagi*, L., bred from ova obtained by Mr R. W. Parfit from a moth taken at the Horsley Field Meeting. This larva was one of several reared on Apple leaves and was very pale in colour.

Mr T. R. EAGLES exhibited: (A) The following viviparous grasses:— (1) *Deschampsia caespitosa*, Beauv., (2) *Festuca ovina*, L., and (3) Undetermined species from Briançon. (B) Inflorescence of the Rose Plantain, the *Plantago rosea-exotica* of Gerard's *Herbal*. It is a variety of *Plantago lanceolata*, L. (C) Galls on the Common Elm caused by the Aphid, *Schizoneura lanuginosa*, Hartig.

Col. P. A. CARDEW exhibited Lepidoptera taken at Rannoch between 24th June and 1st July 1943, including forms of *Erebia epiphron*, Knoch, ab. *scotica*, Cooke, *Coenonympha tullia*, Müller (*scotica*), *Aricia agestis*, Schiff., ab. *artaxerxes*, Fab. (one minor aberration, with white streaks running from the discal spot towards the margin), and *Psodos coracina*, Esp. He also showed a specimen of the "Deer Fly," *Cephenomyia auribarbis*, Mg.

Mr V. E. AUGUST exhibited larvae of *Anaitis plagiata*, L., from N.W. Sussex, feeding on St John's Wort (*Hypericum perforata*, L.).

Dr K. G. BLAIR exhibited the nest of a Pompilid Wasp in a section of old stem of *Angelica*, found at Ashted on 14th June last. The nest consisted of six cells separated by loose wads of moss, withered grass and other fibrous material; the lowest cell of the series, exposed at the break of the stem, may not have been actually the first one of the complete series. When found each cell contained a single brown spider, thought to be *Clubiona holosericea*, Walc., each with a white sausage-shaped egg of the Pompilid attached. When next looked at a fortnight later the last larva, apparently fully grown, had fallen out of the broken cell at the end but was then replaced and held in by cotton wool and eventually spun its cocoon. The next three cells each contained a white cocoon of the Pompilid; in the fifth, from which the spider had been removed for determination purposes, although replaced without damage, no Pompilid had developed; in the sixth (uppermost) cell the larva was then engaged in spinning. The final closing wad was much longer than the others, about $\frac{1}{2}$ in. long, and of different composition, consisting largely of bits of pith apparently gnawed off from the inside of the stem, and nodules of clay of about the same size, but included such odd fragments as bits of a Lepidopterous pupa, *Depressaria heracliana*, Deg., that the wasp had probably found in the stem, and the cast skins of a Sawfly larva and a Grasshopper nymph. This material on drying became loose and fell out. Two very similar nests found by him some years ago in old Thistle stems produced a species of wasp then new to Britain (see R. C. L. Perkins, *Ent. Mo. Mag.*, 53, 1917, p. 10). In these, so far as he could remember, the cocoons were brown and rather larger, but the present cocoons after a winter's exposure may also turn brown. He also showed series of the various inhabitants of the galls of

Rhodites rosae, in connection with Mr Niblett's paper, and read notes on them. (See *Trans.*)

Mr NIBLETT then read his paper, "The Cynipid genus *Rhodites*" (See *Trans.*), and after some discussion, a hearty vote of thanks was moved from the Chair, and carried by acclamation.

12th AUGUST 1943.

The PRESIDENT in the Chair.

It was announced with deep regret that Prof. Sir H. Beckwith Whitehouse, President of the British Medical Association and famous Birmingham gynaecologist, died suddenly on the 28th July last. He had been a member of our Society since 1935 and was keenly interested in the British Lepidoptera.

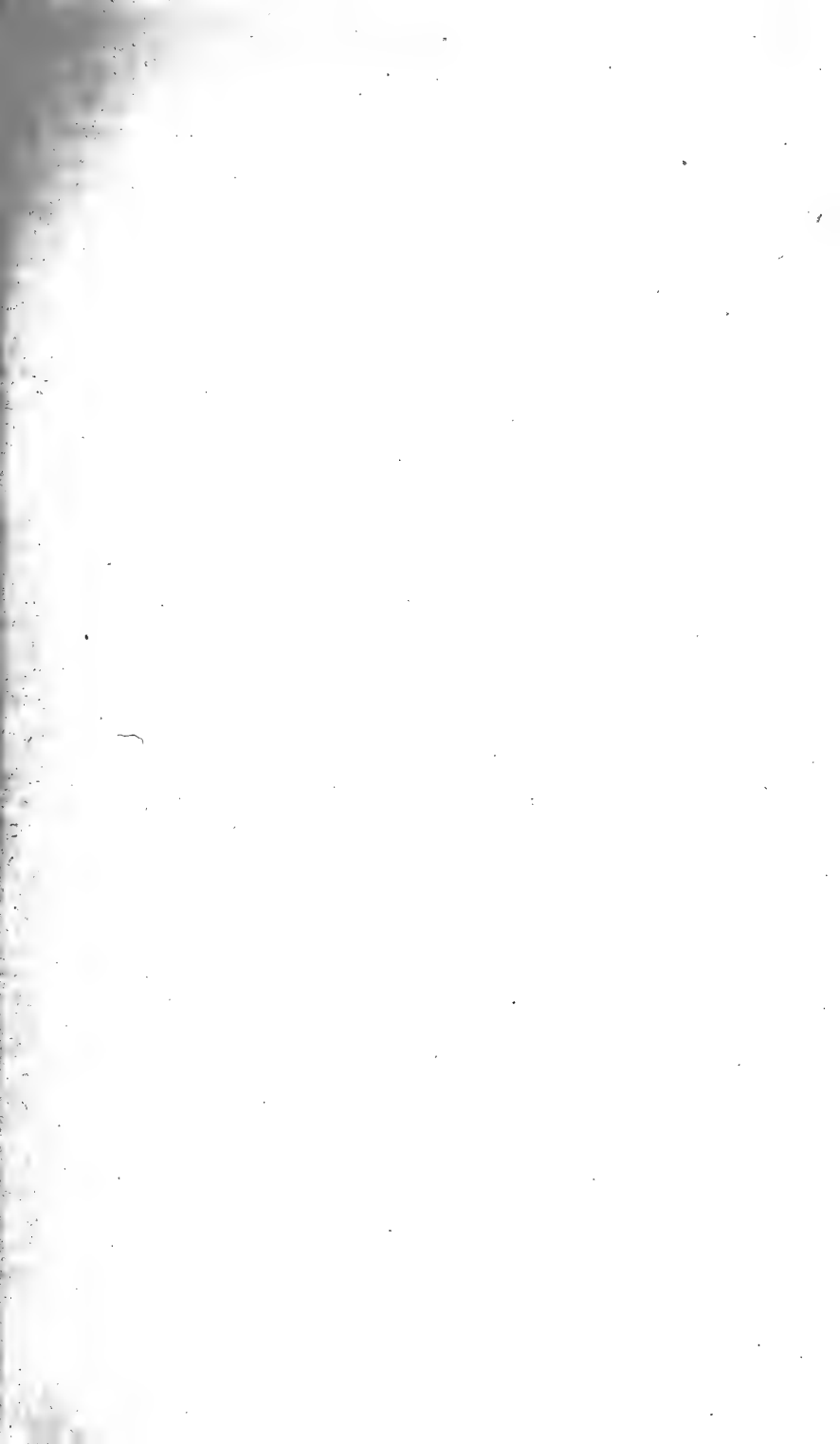
It was also announced that our Publication Fund had received an anonymous gift of £50, which had relieved the Council from the necessity of cutting down the size of the *Proceedings* for 1942-3. A very hearty vote of thanks to this generous donor was moved from the Chair and carried by acclamation.

The following were declared members of the Society:—Richard John Coates, of 6 Malvern Road, Surbiton, Surrey; Philip Walter Milton, of 23 Woodstock Road, Carshalton, Surrey, and Brian Vesey-Fitzgerald, F.L.S., M.B.O.U., Editor of *The Field*, of Red Rise, Burley, near Ringwood, Hants.

Dr K. G. BLAIR exhibited a selection from two broods of *Aglais urticae*, L., one from Wimbledon bred this year showing melanic tendencies, the middle costal spot being united by black scaling with the dorsal, and the two small spots in 3 and 4 also enlarged. These were part of a brood reared in full daylight close to a window with a North aspect. Another brood from the same nettle-bed was reared in darkness in a large tin box, but the resulting insects were all normal. The melanic tendency is thus inherent in the brood and quite independent of the conditions of light in which they are reared. The second brood, from the Chalfont district some years ago, was more normal, but two individuals showed a peculiar flat appearance, the orange colour being unusually uniform throughout, the usual yellow areas between the costal blotches, and outside the dorsal blotch, also those towards the costa of the hind wings, being scarcely indicated.

Mr S. WAKELY exhibited a cocoon found by Mr Ashby between some books in Pinner in September 1942, and the moth which emerged therefrom in June last and which proved to be *Laspeyresia pomonella*, L. (Apple Codlin Moth).

Mr T. R. EAGLES exhibited Corms of *Crocus speciosus*, Bieberstein; *Crocus laevigatus*, Bory de St Vincent, and *Crocus tomasinianus*, Herbert, showing different types of tunic. He also showed *Biarum tenuifolium*, Heldr., an arum from Greece which attracts flies, etc., by means of a nauseous odour.





Mr W. H. A. HARRIS exhibited larvae of *Anaplectoides (Eurois) prasina*, Schiff., reared from eggs obtained from a female taken at sugar in Bucks.

Mr M. NIBLETT exhibited the gall of *Aulacidea hieracii*, Br., on *Hieracium murorum*, L.

Mr E. E. SYMS then gave a lecture on "Our Library" and after some discussion a hearty vote of thanks was moved from the Chair and carried by acclamation.

9th SEPTEMBER 1943.

The PRESIDENT in the Chair.

Lt.-Col. L. E. Becher, of "Newstead," Charterhouse Road, Godalming, Surrey, was declared elected a member.

The PRESIDENT exhibited a living imago of *Celerio livornica*, Esp., bred from an ovum obtained by Lt.-Col. Hawley from a moth taken near Salisbury, 25th June. The newly hatched larva received per Mr Eagles, fed on Dock, *Polygonum baldshuanicum* (??) and *Antirrhinum*; much preferred the last. 25th July, pupated. 9th September, emerged. He also exhibited a number of living specimens of the Tree Bug, *Gastrolestes abietis*, Linn., beaten from Spruce at Blyburgh Wood, Suffolk, on 29th August.

Mr COOTE exhibited another specimen of *C. livornica*, bred 2.ix.1943, from an ovum obtained from the same source and mentioned that his larva ate Sallow as well as Dock. He also showed, on behalf of Mr Goodban, larvae of *Euphydryas (Melitaea) aurinia*, Rott., from Devon, probably beginning to hibernate.

Mr L. G. PAYNE exhibited the beetle, *Platycis minutus*, F., a reputedly local species maturing in August-September. It was found in some numbers under Beech bark in Norbury Park Wood, Surrey, on 29th August 1943. He also exhibited two alien grasses, *Panicum sanguinale*, Linn., and *Setaria verticillata*, Beauv., which occur spasmodically in the Southern Counties. He said that the former, known as the "Fingered Grass," is an annual which has propagated itself all too freely in his garden since he introduced it from the Pas de Calais in 1934, and that the latter has the bristles of the awn reflexed, and the spikelets, especially the lower ones, appear verticillate, or whorled.

Mr T. R. EAGLES and Mr C. N. HAWKINS exhibited living larvae of a number of British Heterocera.

Mr C. N. HAWKINS exhibited a very abnormal growth of Sallow, *Salix atrocinerea*, Brot. = *cinerea*, Auct. (non Linn.), from his garden at Wimbledon, probably caused by a mite, *Eriophyes* sp., attacking the bud of a twig. (See Plate A.) His best thanks are due to Mr W. H. T. Tams for taking the photographs

Capt. JACKSON, R.N., exhibited larvae of *Craniophora ligustri*, Schiff.

Mr R. W. SPARROW exhibited a number of *Heterocerous* larvae from Perthshire and other localities.

Mr J. DEAL reported that he had seen a pairing between a female *Polyommatus icarus*, Rott., and a male *P. (Lysandra) coridon*, Poda, at Shoreham, Kent, on 28th July last. He induced the female to lay her ova on Horseshoe Vetch and Trefoil but by the following Saturday, 31st July, the female died. After examining the foodplants he managed to find four ova but they proved to be infertile.

9th OCTOBER 1943.

RECORDS AND DESCRIPTIONS OF VARIETIES, ABERRATIONS, RARITIES, &c.

Exhibited at the Annual Exhibition of the South London Entomological and Natural History Society at their Rooms on 9th October 1943.

(Owing to the necessity for economizing in space it is regretted that it has been impossible to publish notes for all exhibitors in full.)

Mr B. W. ADKIN.—Five examples of *Apatura iris*, L. (1) Female with extra markings on hindwings; bred, New Forest, 1912. (2) Male var. *iole*, Schiff., taken at Etchingham by Percy Eley, 19.vii.1880. (3) Female var. *semi-iole*, Frohawk; bred, Northampton, by E. A. Rogers, 1906. And on behalf of Mr A. J. Wightman, (4) Female with buff-tinted bands, and (5) Female var. *iole*, bred Sussex, 1943.

Mr S. R. ASHBY.—The Atlas Moth, *Attacus atlas*, L., from India.

Capt. E. S. A. BAYNES.—Dark form of *Apatele alni*, L., bred from Herefordshire larva, and varieties of *Chiasma clathrata*, L., from near Salisbury, including ab. *nocturnata*, Fuchs.

Mr E. J. BEDFORD.—A series of water-colour drawings of British Orchids, and a water-colour drawing and two photographs showing upper and undersides of a variety of *Argynnis cydippe (adippe)*, L.).

Dr K. G. Blair.—The Rose galls produced by the British species of *Rhodites*, together with a number of inquilines and parasites reared from them. (See *Trans.* Paper read 8.vii.1943.)

Mr H. BRITTEN.—Some British Orchids, including varieties, hybrids, and curious specimens; also some Australian Orchids with local names.

Mr A. A. W. BUCKSTONE.—The following varieties of British Lepidoptera:—*Pieris rapae*, L., buff-coloured female with lower spot on disc of forewings absent; Ewell, Surrey, April 1943. *Pararge megera*, L., female, spot on right forewing missing; Fetcham, Surrey, August 1943. *Maniola jurtina*, L., female, spots on forewings represented by small black lines; Fetcham, September 1943. *Polygonia c-album*, L., female underside, comma-mark represented by small white line; bred from Bookham, Surrey, ova June 1943. *Aricia agestis*, Schiff. (*astrarche*, Hufn.), two male undersides, ground colour darker than in type, black spots reduced in size and colour of reddish-orange spots replaced by dark brown, uppersides entirely black; Fetcham, September 1943. *Colias*

croceus, Fourc., females, one with narrow forewings, one with black suffusion covering basal area of forewings and nearly reaching centre spot, one bright orange specimen and an ab. *helice*, Hb.; all captured, Fetcham, August 1943. Living larvae, pupae and imago of *Arctia villica*, L., 2nd brood, bred from Dorking ova. Living larvae of *C. croceus* bred from Fetcham ova. And on behalf of Mr G. H. Strickland, *Aglaia urticae*, L., with black hindwings and black costal spots of forewings united; Chessington, Surrey, 21.ix.1943, and *Limenitis camilla*, L. (*sibilla*, L.), ab. *nigrina*, Weym., Bookham, July 1942.

Dr G. V. BULL.—Two specimens of the rare immigrant Lepidopteron, *Minucia lunaris*, Schiff., bred 14th and 27th April 1943 from larvae taken July 1942 in Kent, and a parasite from a third larva taken at the same time (cf. *Roy. Ent. Soc. Lond.*, 1943, *Proceedings* (C), 8: 19, 24 and 36, and *Entomologist*, 76, p. 114, June 1943). *Catocala electa*, View.—the third recorded specimen taken in this country, captured by D. Molesworth at Hoddesdon, 15th September 1927⁴ (cf. *Entomologist*, 1928, lxi, pp. 139 and 285, and our *Proceedings*, 1928-9, p. 71). *Celerio livornica*, Esp., bred from ova sent from S. Wilts. by Col. Hawley; and *Moma alpium*, Osb. (*orion*, Esp.), bred 1st September 1943.

Col. P. A. CARDEW.—Series of *Erebia epiphron*, Knoch, from (a) Langdale Pikes, Cumberland, (b) Ben Lawers, Perthshire, and (c) Rannoch, to show the similarity between (a) and (b) and the possibility that the Rannoch form may be peculiar to that locality.

Mr S. A. CHARTRES.—Aberrations of *Lysandra coridon*, Poda; E. Sussex in 1943 and previous years.

Dr E. A. COCKAYNE.—Series of *Sterrhia aversata*, L., ab. *amoenata*, Fuchs; *Bupalus piniaria*, L., ab. *funeris*, Cockayne, and one crippled male, ? ab. *nigricarius*, Backh.; also living larvae of *Psodos coracina*, Esp., bred from eggs sent July 1943 from Rannoch by Mr R. C. R. Crewdson, and water-colour sketches of the larvae. These larvae were fed throughout on Crowberry, *Empetrum nigrum*, L.

Mr F. D. COOTE.—*L. camilla*, ab. *nigrina*, Ashted Wood, Surrey, 17.vi.1943.

Mr B. H. CRABTREE.—Selected series of *Arctia caja*, L., bred from larvae found in lanes near Carrington Moss, 1943; *A. urticae*, ab. *nigra*, Tutt; *Brenthis selene*, Schiff., with basal black spots absent; *Euphydryas aurinia*, Rott. (*artemis*, Hb.); upper and undersides of a singularly red form, from Enniskillen, bred by Mr F. B. Cross; *Melitaea athalia*, Rott.; *A. agestis*, ab. *caeca*, (a) underside with very white ground colour, (b) underside with usual red spots on border dark chocolate-brown; *Pieris brassicae*, L., of a yellow-ochreous colour; and *M. jurtina*, a female with very large spots on forewings. And on behalf of Mr A. E. Tonge, the following Lepidoptera, all much darker than the typical forms, bred from larvae taken on the Heaths in the Manchester district:—*Pheosia gnoma*, Fab. (*dictaeoides*, Brahm.), *Notodonta dromedarius*, L., *Lophopteryx capucina*, L. (*camelina*, L.), and *Apatele* (*Acronicta*) *leporina*, L.

Mr J. C. B. CRASKE.—*Brenthis euphrosyne*, L., series of aberrations, Surrey, 1943, including 3 cream forms, 2 males with forewing markings enlarged and banded, 1 male with central area of hindwing black and sub-marginal spots joined to margin, 1 female with rayed hindwings, etc.; *B. selenae*, Surrey, 1943: 6 dark forms with central area of forewings suffused with dark scales, 1 female with cream ground colour, and 1 with pale ground colour and costal spots joined into a bar; *E. aurinia* bred from N. Cornwall larvae, 1943: 4 males and 2 females with white spots forming central band on forewings, 1 pale ochreous female and 1 female with dark markings on hindwing absent. *Nymphalis io*, L., bred from Surrey larvae, 1943: 2 males with spots on hindwings reduced in size and smoky-pearl band around eye spots increased in size, and 1 male with spots below ocelli on forewings absent. *A. urticae*, captured, Surrey, August 1943; male with forewing costal spots almost joined, marginal lunules absent and marginal band suffused, hindwings suffused black over 2/3rds of wing, marginal lunules small, underside with black ground colour and light sub-marginal band absent. *P. c-album*, July 1943; 1 male with forewing margins suffused towards central area and hindwing markings suffused, marginal lunules absent; 1 male (damaged by bird ?) similar to ab. figured on p. 177, Frohawk, *British Butterflies*; 1 female, var. *hutchinsoni*, Robs., bred 9th September 1943, in second brood. *P. megera*, 1943; 1 male with forewing ground colour pale ochreous and 1 female with hindwings pale ochreous. *Heodes (Lycaena) phlaeas*, L., 1942-3, a number of named aberrations. *M. jurtina*, series of male and female aberrations showing symmetrical white markings on fore and hindwings, also 1 female underside with dark basal area extended over light sub-marginal band on hindwing (all 1943). *M. tithonus*, L., 4 females with abnormal extra spots below apical spots and 1 female with cream ground colour.

Mr A. W. DENNIS.—Photographs illustrating the cultivation of the Fullers' Teasel (*Dipsacus fullonum*, Eng. Bot.) in Essex, and the differences between it and the wild Teasel (*D. sylvestris*, L.). Also Brake Fern (*Pteris aquilina*, L.) gathered in Westminster, where it is colonizing suitable places in the bombed areas.

Mr T. R. EAGLES.—Foliage of *Rhus cotinus*, L., and *R. cotinoides*, Nutt.; seeds of *Crinum* and *belladonna* lilies; seed pods of *Akebia quinata*, Decne, and of *Wisteria*, and the Yellow-fruited Yew (*Taxus baccata*, L., var. *lutea*, Endl.).

Mr N. T. EASTON.—*Eumenis semele*, L., ssp. *thyone*, J. A. Thompson; 2 males, 2 females and an underside of this dwarf race peculiar to the carboniferous limestone district near Llandudno, N. Wales, and a pair of the normal form from Prestatyn, N. Wales, for comparison. *P. megera*, a female with double ocellus and 4 extra apical spots on the underside, the double ocellus and three apical spots appearing on the upperside also, Conway Valley, N. Wales, 20.vi.1941. *Argynnis paphia*, L., a male, Droitwich, 4.vii.1943, with albinistic patches of pale primrose on all four wings, those on forewings between the subcostal and

lower radial nervules covering the upper radial, those on the hindwings between median nervules 3 and 4 of South's fig. 9 in his *Butterflies of the British Isles*. *Plebejus argus*, L., ssp. *caernensis*, Thompson ["*Plebejus argus*, L., a new subspecies," J. A. Thompson. No date or place of publication (1937). See *Zool. Rec.*, 1937]. 6 of each sex taken in a restricted locality in N. Caernarvonshire, N. Wales, in June 1941 and 1942, and a pair of typical *argus* for comparison. This subspecies is very much smaller than typical *argus*, the male varying between 16 and 22 mm. and the female between 15 and 20 mm. when fully expanded. The black border of the male is greatly reduced, in some specimens almost absent, whilst the majority of females are very strongly suffused with purple-blue. *Caernensis* occurs at a considerable elevation on certain limestone cliffs near the sea, and its time of emergence is much earlier than typical *argus*, often as early as the second week in June, and it never flies with the typical form, being confined to totally different surroundings and conditions. *Laotioë populi*, L., a female, bred 1.vii.1942, showing olive-green bands on a pale silver-grey background. Several similar specimens were bred by the exhibitor during 1940-1942; a female, bred Droitwich, 24.vi.1942, combining the last-mentioned form with the well-known pink form, showing alternate bands of pink and olive-grey on the forewings, giving a rainbow effect; a gynandromorph, bred 4.vi.1943, from a Droitwich male assembled to a female from a 1939 Suffolk strain. The sexual division about a longitudinal axis is perfect, affecting antennae, wing size and coloration, and genital organs, right side ♂, left ♀. A similar example with sexes reversed was bred from the same stock in 1941. *Panaxia dominula*, L., typical and bred aberrations:—*ocellata*, Ktlwl., male, Hants, May 1943; *crocea*, Schultz, 2nd brood, 26.ix.1943; *medio-nigra*, Cckne., 3 examples, May 1943; an extreme *medio-nigra*, heterozygous both for *bimacula*, Cckne., and for the form with "pin-point" or no basals, male from Oxford larva, 16.vi.1942; *bimacula*, 2nd brood male, homozygous recessive; a specimen with extremely large forewing markings, dusted with orange scales, and confluent to form bands, hindwings of normal colour but with the black markings reduced to "pin-points" and encircled with yellow, believed to be an unique expression of the ab. *illustris*, Ktlwl., gene-complex, Hants, 14.vi.1942; *illustris*, with blue-black forewings, heavily marked with white spots confluent to form bands and dusted with orange scales, hindwings of the pale tomato-pink characteristic of ab. *illustris*, are lightly marked with black encircled with yellow, 2 males, 1 female, May and June 1943, ex Hants strain; *Callimorpha jacobaeae*, L., two females bred from E. Berkshire larvae, 1937, showing confluence of scarlet costal bar with apical spot and enlargement and elongation of scarlet spot at inner angle of the forewings; *S. aversata*, caught, Droitwich, 10.vii.1943, a female showing asymmetry in the markings and banding of the forewings; *Xanthorhoe montanata*, Schiff., caught, Droitwich, 27.v.1943, a male with forewing band reduced to spots extending from costal margin to discal only, other markings extremely light and indistinct.

CANON T. G. EDWARDS.—*C. croceus*, ab. *helice*, 4 specimens faintly tinged with yellow, and one bred variety from egg laid by *helice* female, S. Wales; *Euchloë cardamines*, L., 4 specimens of the small form, Dove-dale, 1932; *M. athalia*, S. Cornwall, July 1942; *B. (A.) selene*, with partial absence of spots, S. Cornwall, July 1942; *Pyrgus malvae*, L., var. *taras*, Meig., 4 specimens, S. Cornwall, various dates; *Hyloicus pinastri*, L., bred series, 6th-9th June 1943; *Amathes castanea*, Esp., a series showing ground-colour variation, at sugar, Burnt Woods, Staffs, 1932; *Antitype xanthomista*, Hb., var. *nigrocincta*, Tr., at sugar in N. Cornwall, 1936; *Cosymbia pendularia*, Clerck, ab. *decoraria*, Newm. (= *subroseata*, Wdfd.), Burnt Woods, Staffs, 1933; *Lampropteryx otregiata*, Metcalf., taken at light, S. Cornwall, 1937.

MR W. J. FINNIGAN.—Lantern slides and larvae of *L. capucina* (*cameлина*), pink form, and *Demas coryli*, L.

MR E. B. FORD.—*Erebia aethiops*, Esp., probably the only existing Cumberland specimen, compared with specimens from Scotland, Westmorland, and from an extinct Yorkshire race. *Polyommatus icarus*, Rott., examples from the uninhabited island of Tean, Isles of Scilly. In this race the females are of a remarkable silvery-blue. Also specimens showing the method of marking used in estimating the absolute numbers of a wild population of Butterflies, first worked out on this island.

MR L. T. FORD.—Larvae of *Nepticula betulicola*, Stainton, feeding in leaves of Birch. These larvae are found only on leaves close to the ground.

MR H. W. FORSTER.—A selection of less common beetles from Epping Forest, 1909-1943, including *Calosoma inquisitor*, L., *Conosomus bipunctatus*, Gr., *Bryocharis cingulata*, Mann., *B. inclinans*, Gr., *Quedius ventralis*, Arag., *Aulonium trisulcum*, Geoff., *Epuraea guttata*, Ol., *E. fuscicollis*, Steph., *E. angustula*, Sturm, *Rhizophagus nitidulus*, F., *R. picipes*, Ol., *Pediacus dermestoides*, F., *Aphodius zenkeri*, Germ., *Athous rhombeus*, Ol., *Megapenthes lugens*, Redt., *Prionocyphon serriornis*, Müll., *Rhagonycha translucida*, Kryn., *Prionus coriarius*, L., *Grammoptera variegata*, Germ., *Pogonochaerus hispidulus*, Piller, *Pseudocistela ceramoides*, L., *Tetratoma desmaresti*, Latr., *T. ancora*, F., *Phloeotrya rufipes*, Gyll., and *Asclera coerulea*, L.

MR F. W. FROHAWK.—*N. io*, 4 specimens with abnormal ground colouring ranging from pale smoky-brown to deep purplish-brown similar to the ground colour of *N. antiopa*, L.

MR F. T. GRANT.—A selection of Coleoptera taken in Cobham Park, near Gravesend, during 1943, including 1 *Stenostola ferrea*, Sk. (new to the local list), beaten from Hazel; 2 *Conopalpus testaceus*, Ol., 1 var. *vigorsi*, S., beating Whitethorn bushes under Oak tree; 1 *Podabrus alpinus*, Pk. (new to the local list), beating May blossom; 7 *Anaglyptus mysticus*, L., beating May blossom; 10 *Cryptocephalus coryli*, L., beating May blossom and Hazel bushes; 5 *Tillus elongatus*, L., crawling on fallen and decayed Hornbeams at parts infested with beetle, *Ptilinus*

pectinicornis, L.; also living larvae of *Pyrochroa coccinea*, L., and *P. serraticornis*, Sp.

Lieutenant-Commander G. W. HARPER, R.N.—*A. paphia*, a female aberration, near Arundel, 3.vii.1943; *B. (A.) euphrosyne*, aberrations, (a) upper surface buff, lower surface with all rust colouring missing, (b) upper surface with confluent basal black markings, both specimens, 21.v.1943, near Petworth in same locality; *M. athalia*, typical specimens, 12.vi.1943, in Sussex; *L. coridon*, ab. *fowleri*, South, 13.viii.1943, near Shoreham; *C. croceus*, ab. *pallida*, Tutt, two specimens, 22.viii and 4.ix.1943 respectively, in Sussex; *C. livornica*, 8.ix.1943, Rustington, Sussex.

Mr W. H. A. HARRIS.—*A. caja*, three varieties, which occurred whilst breeding from forward larvae during 1943, (a) all wings dark brown except for a few cream hair-lines on forewings and a patch of orange near body on right hindwing, slightly deformed, (b) normal forewings, hindwings with all outer spots united to form a broad blue band, (c) hindwings with blue spots much extended and joined; *Dasychira pudibunda*, L., some very small 2nd brood specimens from Bucks, ova laid 27.v.1943, larvae fed on Hop; *E. semele*, extremely large female, Hants, 1943; *Aphantopus hyperantus*, L., two ab. *lanceolata*, Shipp, Bucks, July 1943; *Brenthis (A.) euphrosyne*, variety from Bucks, May 1943, forewings lightly marked with black dusting except for two large central spots, hindwings with basal two-thirds black and lanceolate markings reaching to the margins; *A. paphia*, ab. *confluens*, Splr., male, Hants, July 1941; *Polyommatus (Lysandra) bellargus*, Rott., a female underside with very dark ground colour, and an extreme variety male underside—fringes, continuous grey streak, forewings with lunules all merged into one continuous marking, and marginal spots joined transversely, two, three and two, in a zigzag form, hindwings with lunules joined into a red streak and some spots joined transversely to form bars also in a zigzag formation; *Papilio machaon*, L., all wings thinly scaled, light in colour and of a greasy appearance, bred from wild ova, Wicken Fen.

Mr C. N. HAWKINS.—(1) A melanic female of *Xanthorhoe fluctuata*, L., taken in his garden at Wimbledon on 4.ix.1942, together with the small brood reared from her ova. The captured female laid 19 ova, of which 18 hatched; 4 larvae died or failed to pupate properly, 2 pupae died and 12 moths emerged during May, June and July 1943. Of these, 7 (3 females and 4 males) were melanic and 5 (3 females and 2 males) were normal. All attempts to carry on the strain failed; black × black and normal × normal (twice) gave ova but all proved infertile. This melanic form is probably a dominant, but, unfortunately, no proof could be obtained as the male parent of the brood was, of course, unknown. (2) an ab. *costovata*, Haw., of the same species, fairly extreme, taken in the same locality on 30.vii.1943; this was a male. (3) an unusual aberration of *Fuxoa nigricans*, L., bred from a pupa dug up in the same locality on 19.vi.1943. This specimen emerged on 2.viii.1943 and has

the head, thorax and forewings almost entirely sooty brown, the stigmata faintly outlined in black, the reniform filled in with white except a small portion at the inner edge, and a streak across the lower end where a vein crosses it, white basal, antemedial, postmedial and subterminal lines and two (with traces of a third just below the costa) white or whitish longitudinal streaks joining the basal and antemedial lines and tending to extend beyond these two lines, both basal and outward to the claviform and reniform stigmata respectively. (4) a male specimen of *Boarmia repandata*, L., with buff ground colour and all-buff underside, Ashted, on 26.vi.1943; and various other Lepidoptera.

Mr H. HAYNES.—*P. (L.) coridon*, a long series of forms chiefly from the Salisbury district, including *obsoleta*, Tutt, *caeca*, Courv., *syngrapha*, Kefstn., males with *striata*, Tutt, forewings, and one gynandromorph; Hybrid *L. coridon* and *L. bellargus* (= *polonus*, Zell.), a fine example, Salisbury district, June 1943; *L. bellargus*, a long series from the same district including abs. *parvipuncta*, Reb., *obsoleta*, and *striata*; *Pieris napi*, L., heavily marked forms from Northern Scotland and examples of well-marked ab. *citrona*, Frohawk, including two albinos of this form; *P. dominula*, a series bred from the Salisbury district, including abs. *conjuncta* and *diluta*, Ktlwl.

Capt. R. A. JACKSON, R.N.—A large number of British Lepidoptera, including (a) *P. napi*, a brownish female with very yellow underside; (b) *E. cardamines*, a male underside with an extended patch of canary colour below the costa; (c) *M. tithonus*, a male without white centres to the ocelli on the forewings; (d) *M. athalia*, a series from E. Kent, including a male caught on 2nd June, the remainder bred from larvae collected on same date; (e) *Cupido minimus*, Fuess., an underside with hindwings unspotted; (f) *Acontia luctuosa*, Schiff., and *Emmelia trabealis*, Scop., examples from the Breck district freshly emerged on 29th June 1943, an exceptionally late date; (g) *Orthosia stabilis*, Schiff., a male showing symmetrical patches on forewings, probably due to defective scaling, but giving the appearance of grease, taken wild; (h) a box showing examples of "Clear-wings" bred during 1943, including *Sphecia hembeciformis*, Hufn. (*crabroniformis*, Lewin), *Aegeria spheciiformis*, Schiff., *A. andrenaeformis*, Lasp., and *A. vespiformis*, L., the exhibitor pointing out that the female *andrenaeformis* is distinguishable by the brighter yellow bands and a whitish patch under the abdomen, and that the *vespiformis* showed considerable variation in the yellow banding of the scales.

Mr S. N. A. JACOBS exhibited his very beautiful drawings in water-colour of the 49 species of British *Lithocolletis*, proposed for a plate in our *Proceedings*.

Col. S. H. KERSHAW.—*E. cardamines*, two male var. *luteus*, Frohawk, and one female with male *luteus* colouring on wing tips on underside; *P. icarus*, gynandromorph from Isle of Man, and two striated ditto from Bedfordshire; *L. coridon*, male var. *marginata*, Tutt; *P. c-album*, with pale reddish drab ground colour and very heavy black markings,

central spots joined as in *ab. polaris*, Stdgr., of *A. urticae*; *P. megera*, 3 females with black centre-bands; *Argynnis aglaia*, L., a radiated black male from the Isle of Man; *Heodes phlaeas*, a number of named forms including one with the blue splashes of *ab. coeruleopuncta*, Stdgr., replaced by fiery red; *P. malvae*, var. *taras*; *L. bellargus* (*adonis*, Schiff.), a slate-grey male, and other species and varieties of Lepidoptera.

Dr H. B. D. KETTLEWELL.—*C. livornica*, (a) 23.viii.1943, Cranleigh, Surrey, (b) bred 31.viii.1943, ex larva on Dock, Cranleigh, (c) two bred September 1931, ex larvae on Bedstraw, Dungeness, (d) preserved larva, ex Bedstraw, Dungeness; *A. villica*, *ab. radiata*, Spul., a series of 10 specimens assembled 1943 at Cranleigh; *A. caja*, a series of 36, bred by Mr Sharman, showing modifications of *abs. petribergensis* and *decrescens*, Ckne.; *Parasemia plantaginis*, L., series of aberrations bred 1938-1942; *P. dominula*, series bred 1943 from wild larvae, including *abs. albomarginata*, Kettwl., *brunnescens*, Kett., *crocea*, Schultz, *juncta*, Ckne., etc., and series of broods bred in 1943 at (a) 70° F. and (b) normal outdoor temperatures, with controls showing differences in phenotypes; and other species.

Mr D. E. KIMMINS.—Two specimens of the new British Plecopteron, *Protonemura montana*, Kim., from Hayeswater Gill, Westmorland, 1700 ft., 8.ix.1943, and generously presented by the describer to the Society. [For original description see *Journ. Soc. Brit. Ent.*, 2: pp. 89-93 (1941).]

Mr H. A. LEEDS.—Aberrations of six species of British Rhopalocera, including *P. icarus*, *A. agestis*, *L. phlaeas* and a very large number of coloured drawings of forms of *L. coridon*, all designated in accordance with the Bright and Leeds *Monograph*.

Rev. J. N. MARCON.—Aberrations of British Rhopalocera taken by himself during 1943, including *B. (A.) euphrosyne*, female with dark basal areas (hindwings) and confluent marginal spots; *B. (A.) selene*, male, broadly banded; *A. cydippe* (*adippe*), female *charlotta*, Haw., form, male, the hindwing marking being confluent and another male banded and blotched; *E. aurinia*, female underside, cream-banded, red-brick basal area; *P. icarus*, female *ab. flavescens*, Tutt, and male underside with slightly radiated forewings, hindwings with cream rays, largely obsolete spotting and chevrons with red lunules prominent; *P. (L.) coridon*, males, (a) *nigrescens suffusa*, Tutt, with one streak of normal colouring on left hindwing, (b) *ultra fowleri*, South, (c) underside *ab. coronetta*, Tutt; and other exhibits not taken by himself, including *Heodes phlaeas*, male, extreme *radiata*, Courv., under and upper-side; *P. argus* (*aegon*, Schiff.) male, extreme *sagittata*, Courv.; *P. icarus*, *ab. alba*, Tutt, a large male with some spots tending to radiate, and handsome white margins; *L. bellargus*, male, whitish underside with *digitata*, Courv., markings; *L. coridon*, *ab. lacticolor*, Tutt, female; *A. paphia*, male, with unusually heavy and extended androconial markings on forewings and obsolescent spotting on hindwings, and extreme form; *B. euphrosyne* female underside with long silver streaks, extend-

ing to discoidal, forewings heavily blacked, extreme form; *B. selene*, male, forewings margine-extensa, hindwings with fulvous rays, suffused by marginal spots running into large central black area.

Mr P. METCALF.—A number of light and very fine dark-banded and dark outer-margined varieties of *Griposia* (*Agriopis*) *aprilina*, L., from Somersetshire, selected from some 3000 specimens bred from dug pupae over a number of years.

Mr P. W. MILTON.—British Freshwater Mollusca, including *Unio pictorum*, L., *Anodonta cygnea*, L., *Sphaerium rivicola*, Leach, *Dreissensia polymorpha*, Pallas, *Viviparus viviparus*, L., all from Kingston-on-Thames; *Theodoxus fluviatilis*, L.; and *Physa fontinalis*, L., from the Wandle, Carshalton, and a number of others from Epsom Common.

Mr A. M. MORLEY.—*L. coridon*, *L. bellargus*, *P. icarus*, and *A. agestis*, a number of named forms from Folkestone and Wilts, all but one 1943; *Acherontia atropos*, L., one Margate, 7.x.1942, and one Hythe, 8.x.1942; *Zygaena trifolii*, Esp., with small spots on forewings and broad border on hindwings, Folkestone, 1943; *Diacrisia sannio*, L., with central spots on hindwings joined by a bar to base, Folkestone, 1943; *Abraxas grossulariata*, L., with heavily marked forewings, Folkestone, 1943, and *X. fluctuata*, var. *neapolisata*, Mill., Folkestone, 1943.

Mr L. H. NEWMAN.—*M. tithonus*, Tavistock district, July 1943, some with almost black hindwings, others very heavily spotted on the upper wings in both sexes, one pale grey male and another albino form.

Messrs G. B. and G. H. OLIVER.—*C. croceus*, long series showing wide variation in normal colour specimens and in vars. *helice* and *pallida*; *B. (A.) euphrosyne*, *B. (A.) selene*, and *E. aurinia*, various aberrational forms; *Coenonympha pamphilus*, L., a series illustrating extreme range of upperside shades from very pale to as darkly coloured as a normal Witherslack *C. tullia*, Müller (*davus*, Fab.), male, and some underside variations; *A. hyperantus*, var. *lanceolata*, a pair, Bucks; *Pararge aegeria*, L., a male with extra dark forewings and black hindwings, and another male with markings generally blurred and all eyespots blind, Bucks.

Mr A. RICHARDSON.—A large number of British Lepidoptera taken or bred during 1943, including *C. livornica*, two, Beaudesert Park, Minchinhampton, Glos, and one bred (the first to emerge of 17 pupae) and 9 preserved larvae; *Hemaris fuciformis*, L., Glos; *Gastropacha quercifolia*, L., New Forest; *Catocala sponsa*, L., New Forest; *Craniophora ligustri*, Schiff., including one melanic var., bred Rannoch; *Orthosia* (*Taeniocampa*) *gracilis*, Schiff., 6 dark red vars., bred Somerset; *Panolis flammea*, Schiff. (*piniperda*, Panz.), including 7 of the green variety, bred, Aviemore; *Enargia paleacea*, Esp., 18 of the dark orange form, Aviemore; *Rhyacia simulans*, Hufn., 70 specimens, Glos, on Valerian flowers, where in one garden it was the commonest of the Agrotidae; *Hypena obsitalis*, Hb., the 4th (?) recorded British specimen, Cornwall; *Leucania unipuncta*, Haw., one, Cornwall; *L. vitellina*, Hb., four, Cornwall; *Cryphia* (*Bryophila*) *muralis*, Forst., ab. *impar*, Warren, nine,

bred Glos; *Eupithecia irriguata*, Hb., seven, bred New Forest; *P. coracina*, also 2 larvae not previously known in full-grown stage, and 1 bred parasite, Aviemore; *Ematurga atomaria*, L., gynandromorph, left side ♂, right side ♀, Aviemore or Rannoch; *B. euphrosyne*, heavily marked, including three very fine banded abs. and two with pale patches, Glos; *A. hyperantus*, ab. *lanceolata*, one, Glos; and many other species. Most of the species also included preserved larvae.

Mr A. J. ROSE.—Rhopalocera taken at Hyères during 1st week in April 1909 in sudden fine, bright, spell after some weeks of damp and cold:—*Gonepteryx cleopatra*, L., *P. machaon*, *P. podalirius*, L., *N. antiopa*, *Zerynthia polyxena*, Schiff., *Z. medesicaste*, Illi., *Euchloë euphenoides*, Staud., *E. belia*, L., *Pontia daplidice*, L., *Argynnis lathonia*, L., *P. c-album*, *Melitaea cinxia*, L., *Tomares (Thestor) ballus*, Fab., *Philotes (Scolitantides) baton*, Bergstr., *Cyaniris cyllarus*, Rott., *Lycaenopsis argiolus*, L., *Callophrys rubi*, L., and *P. malvae*, etc.

Mr A. G. B. RUSSELL, M.V.O., *Lancaster Herald*.—*Dysstroma truncata*, Hufn., and *D. citrata*, L. (*immanata*, Haw.), series from the counties of Dorset, Kirkcudbright, Perth, Moray and Inverness for comparison, including a number of specimens believed to be of the form or species taken at Aviemore from 15th-22nd June and 1st-4th July 1943, which it has been suggested is a Highland form of *D. concinnata*, Steph.; *Epirrhoë alternata*, Müll. (*sociata*, Bork.), from the counties of Dorset, Kirkcudbright and Inverness for comparison in view of a suggestion, which has been made, that the Scottish specimens with their blacker markings may prove to be a distinct species; *X. montanata*, two almost wholly cream-coloured specimens with vestiges only of the central band and marginal markings, Dorset; *X. fluctuata*, three specimens of the dark grey Highland form from counties Perth and Inverness; *Calostigia olivata*, Schiff., a series of a dark banded form from the Rannoch area; *C. clathrata*, ab. *nocturnata*, two specimens taken in the Salisbury area, 1943; *Thera obeliscata*, Hb., large Aviemore race; *Ortholitha scotica*, Cockayne, a diminutive male from Aviemore.

Mr L. A. E. SABINE.—*P. megera*, a banded female; *C. croceus*, var. *helice*, a pure white specimen with hindwing spots very small and very pale; *M. jurtina*, an almost white male, a white male rayed with normal colour, a male with symmetrical white areas on all wings, a female similar to normal male and with the fulvous bands obsolete, a pale female with all wings mottled and streaked with darker; *P. icarus*, a heterochroic halved male; *A. urticae*, a male with rayed hindwings, a male with large blue spots and red area on hindwings much reduced, a male with costal black blotches coalescing; *B. selene*, a smoky female; and *B. euphrosyne*, a female with broad black central band.

Mr P. SIVITER SMITH.—*Heodes (L.) phlaeas*, series of bred spring brood specimens, including three with aberrant neurulation and curious "eye-spots" of red and black on the posterior edge of the hindwing undersides, and others which had been subjected to heat while pupae, causing

them to emerge as characteristic summer brood specimens (var. *initia*, Tutt), suffused dark and with heavier spotting, and bred and caught summer brood specimens for comparison; ab. *alba*, Tutt, ♂ and ♀ from Burbage Wood, Leicestershire, and Ditchling, Sussex; ab. *berviniensis*, Siv. Sm. [*Entom.*, 65, p. 241 (1932)], the unique type; and a halved gynandromorph found among some specimens from the G. Machin collection, and the 4-colour blocks and proof sheets of the *P. dominula* plates in our last volume of *Proceedings*; etc.

Mr R. W. SPARROW.—Microlepidoptera taken 1941-1943, including *Plutella daleda*, Staint., beaten from heather, Rannoch; *Depressaria umbellana*, Steph., frequent on Tunbridge Wells Common, larvae on Furze, spinning terminal shoots together; and *Tortrix paleana*, Hb., common in May and June this year in larval form feeding on leaves of *Centaurea* near the Warren, Folkestone.

Mr A. H. SPERRING.—*Lygris testata*, L., banded form from Exmoor; Hybrid *Smerinthus ocellatus*, L., male \times *L. populi* female = *Smerinthus hybr. hybridus*, Steph.; and *P. napi*, bred from wild Donegal female.

Mr W. H. SPREADBURY.—Photographs of Fungi.

Mr J. A. STEPHENS.—Some rare Coleoptera mostly from Kent. (a) From Cobham Park:—*Quedius scitus*, Gr., from old tree mould, 16.ix.1942; *Anisotoma orbicularis*, Hb., from decaying Hornbeam, 22.viii.1942; *Dacne humeralis*, F., and *D. rufifrons*, F., in fungi, 30.ix.1943; *Ctesias serra*, F., from a standing dead Ash tree, 5.vi.1942, the first specimen taken in this district (J. J. Walker says "the larva is often met with but never have I taken the perfect insect"); *Athous rhombeus*, Ol., from decayed Hornbeam, 23.vi.1938 and 14.vii.1943; *Cryptocephalus coryli*, L., from Hawthorn blossom, 18.v.1943. (b) From Chatham or Walderstude:—*Soronia grisea*, L., by beating Ash trees, 20.viii.1943; *Chrysomela goettingensis*, L., and *C. hyperici*, Fo., by sweeping, 20.iv.1943. (c) From other localities:—*Lixus paraplecticus*, L., New Hythe, banks of Medway, on wild Parsnip, 31.vii.1942, and *Pogonus luridipennis*, Gm., Severn beach near Avonmouth, under seaweed, 27.v.1943, not found in the London district.

Mr S. WAKELY.—A number of species of British Lepidoptera taken during the current season, including *H. pinastri* (bred from Dorset ova); *C. livornica* (bred from Salisbury ova); *Setina irrorella*, L. (Mickleham); *Parascotia fuliginaria*, L. (bred from Berkshire larvae); *Philereme vetulata*, Schiff. (Bexley, Kent); *Discoloxia blomeri*, Curt. (Stroud, Glos); *Eupithecia pimpinellata*, Hb. (bred from Riddlesdown larvae); *Dioryctria abietella*, Fab. (Ockham, Surrey); *Scoparia basistrigalis*, Knaggs (Boxhill); *Psammotis hyalinalis*, Hb. (Mickleham); *Pyrausta nubilalis*, Hb. (bred, Benfleet, Essex); *Cynaeda dentalis*, Schiff. (bred from pupae found at Betchworth, Surrey); *Trichoptilus paludum*, Zell. (bred, Berkshire); *Alucita baliodactyla*, Zell. (bred, Chipstead, Surrey); *Phalonia rutilana*, Hb. (Surrey); *Phtheochroa sodaliana*, Haw. (bred, Riddlesdown); *Euxanthia aeneana*, Hb. (bred, Benfleet); *Laspeyresia aurana*, Fab. (bred, Coulsdon, Surrey); *L. strobilella*, L. (bred, Mickleham); *Re-*

curvaria leucatella, Clerck (bred, Norwood); *Gelechia rhombella*, Schiff. (bred, Norwood); *Stomopteryx vorticella*, Scop. (bred, Berks); *Blastodacna stephensi*, Staint. (South London); *Mompha epilobiella*, Roem. (bred, Effingham, Surrey); *M. decorella*, Steph. (bred, Mickleham); *Blastobasis lignea*, Wals. (Norwood); *Depressaria douglasella*, Staint. (bred, Horsley, Surrey); *Eupistra conspicuella*, Zell. (bred, Benfleet); *Lithocolletis scabiosella*, Doug. (bred, Addington, Surrey); *L. compar-ella*, Zell. (bred, S. London); *Epermenia profugella*, Staint. (bred, Riddlesdown); *Scardia boleti*, Ochs. (bred, Betchworth and Norwood); and *Micropteryx mansuetella*, Zell. (Bexley, Kent).

Mr B. W. WEDDELL.—*A. caja*, an extreme variety bred from a pupa sent from Selkirk, Scotland, July 1936, and six *Plusia bractea*, Schiff., bred May 1939 from ova laid by a female caught August 1938 in Selkirk.

Mr H. O. WELLS.—A series of varieties of *P. (L.) coridon*, including a very fine ab. *obsoleta* and a female with male markings, also some fine varieties of *M. jurtina* and *C. pamphilus*, all caught in 1943 within two miles of Epsom.

Mr A. WELT.—*Hemerophila abruptaria*, Thnbg., a series showing the usual S. London form, and the summer and subsequent spring broods from a melanic pair, and four sketches illustrating the hibernating attitude of *Lithophane semibrunnea*, Haw.

BARON DE WORMS.—Series of a large number of British Lepidoptera taken or bred during 1943, including *A. paphia*, a heavily marked male and a female with heavy border, New Forest; *B. (A.) selene*, (a) male with forewing markings glomerate, (b) female with base of hindwings very black, S.E. Hants, (c) male with confluent markings on hindwings and barred margin of forewings on which the normal band is absent, approximating to f. *murphisa*, Spängberg, New Forest area, 23rd May, 1943; *L. coridon*, several named male forms, and a very rare male aberration having the forewings spotless (*caeca*) and the hindwings *radiata* on a chalky ground, Salisbury, 7.vii.1943, an extremely early date, also an example of f. *syngrapha*, Kef., from Salisbury, and a female with part of one hindwing having male coloration; *L. bellargus*, a male with scaling defective, giving a deep purple coloration (Salisbury, June 1943), a female with underside *digitata* and *parvipuncta* forms; *A. agestis* (*astrarche*, Bergst.), obsolescent underside forms from Winchester; *P. icarus*, *juncta* forms of female undersides and obsolescent male; *A. iris*, male bred from Surrey and a female bred from Salisbury district; *M. jurtina*, a pale female (Salisbury); *C. livornica*, a dark male, Salisbury, 9.vi.1943; *Achlya flavicornis*, L., form without cross bands, Surrey; *T. obeliscata*, melanic form from Surrey; *O. scotica*, a very dark male from Aviemore; *O. bipunctaria*, Schiff., female with dark band on white ground, Salisbury; *Cidaria corylata*, Thnbg., f. *albo-crenata*, Curtis, from Aviemore; *C. clathrata*, f. *nocturnata*, Salisbury; *Z. trifolii*, confluent forms from Salisbury; *Catocala promissa*, Schiff., male, bred from Salisbury area; *Drepana falcataria*, L., pale form from Aviemore, and *O. gracilis*, a very dark red example bred from the New

Forest. And, on behalf of Lt.-Col. C. W. Mackworth-Praed, examples of the newly-discovered race of *Carterocephalus palaemon*, Pall., from Western Scotland, including an extreme aberration with black forewings, and specimens of the Southern race for comparison.

Exhibits were also made by Major H. S. FREMLIN, Lt.-Col. W. G. B. HAWLEY, Messrs H. MAIN and C. G. PRIEST.

13th NOVEMBER 1943.

The PRESIDENT in the Chair.

It was announced that Mr W. G. Sheldon, F.Z.S., F.R.E.S., had been nominated by the Council under Bye-Law 8 as an Honorary Member of the Society, in recognition of his great services to Entomology and to this Society.

The following donations to the Society's collections were also announced:—By Mr E. E. Green, five boxes of British *Tortricidae*; and by Mr D. E. Kimmins, the describer, two specimens of the new British Plecopteron, *Protonemura montana*, Kim.

Mr S. WAKELY exhibited: (a) a small metallic green fly, *Microchrysa polita*, L., with two Chelifers (probably *Chernes nodosus*, Schr.), which were observed attached to its legs, found at Norwood; (b) a bug, *Nabis apterus*, F., male, found attacking an Ichneumonid, *Pimpla inquisitor*, Scop., female, taken in a curled Aspen leaf at Darenth Wood, Kent; and (c) a larva of the Narcissus-bulb fly, *Merodon equestris*, L., *in situ*, from Norwood. The insects were identified by Dr K. G. Blair.

Dr G. V. BULL exhibited specimens of *Perizoma bifaciata*, Haw., ab. *unifasciata*, Haw., bred in 1943, and a parasite bred from the larvae in 1941. He also reported seeing *Colias croceus*, Fourc., on 9th November.

Mr M. NIBLETT exhibited Galls of *Andricus fecundatrix*, Htg. (*Cynipidae*) and the following insects bred from them:—(a) Gall-wasps, *A. fecundatrix* and *A. trilineatus*, Htg.; (b) Inquilines, *Synergus pomiformis*, Fonc., *S. vulgaris*, Htg., and *S. evanescens*, Mayr. He also showed acorns of *Quercus robur*, L., and *Quercus sessiliflora*, Salb., and insects bred from them:—*S. evanescens*, Mayr. Alternating generations. Gall and Gall-wasps of *Andricus radicis*, Fab. Galls of *A. trilineatus* induced by sleeved *A. radicis* on leaves of *Quercus robur* and Gall-wasps bred from them.

Dr K. G. BLAIR exhibited a book from Sierra Leone, badly damaged by the borings of an Anobiid beetle, probably *Calymmoderus bibliothecarum*, Poey. The damage was mainly in the thick card-board of the covers, but parts of the letterpress were also riddled.

Mr T. R. EAGLES exhibited a batch of Lepidopterous ova found on the skin of a bought imported (?) apple. They appeared to be Lasio-campid and it was suggested they might be an unusual batch of *Malacosoma neustria*, L. He also exhibited, on behalf of Mr O. J. Janson, leaves, etc., of the Parrot-pod Plant (*Asclepias incarnata*, Linn.), also

known as Swamp Milk Weed or Silk Weed. A native of N. America, introduced here in 1710. Height 4 to 5 ft., flowers flesh colour, having a delicious scent, numerous in corymbose umbels (Robinson, "Hardy Flowers") and various other *Asclepiadaceae* (Swallow-worts) from a garden at St Albans (Mrs Lawrence, September-October 1943). In a note accompanying the exhibit Mr Janson said the *Asclepiadaceae* comprise about 150 genera and nearly 1000 species (Hemsley). *A. incarnata* is near the better known *A. tuberosa*, L. (Butterfly Weed or Pleurisy Root) and may be only a subspecies or variety of it. *A. tuberosa* is used as a remedy in cases of pleurisy, pneumonia and catarrh; *A. curassavica*, Linn., as an emetic purgative, cathartic, and for the fine fibres from the stems used in textile fabrics, etc. (Lindley). Little is known as to uses of the other species.

Mr S. N. A. JACOBS reported that a female *Cosmolyce boeticus*, L., was captured on 24th October last seated on a Lupin pod at Ditchling, Sussex, by Major Armstrong, who gave it to a friend to try for eggs.

Mr C. McK. JARVIS then read a most interesting paper on "Sir Joseph Banks," illustrated with a number of Lantern slides, etc. (See *Trans.*)

A hearty vote of thanks was moved from the Chair and carried by acclamation.

11th DECEMBER 1943.

The PRESIDENT in the Chair.

The deaths of the following members were announced:—Mr H. Willoughby Ellis, on 15th October last; Prof. Sir Edward B. Poulton, D.Sc., M.A., F.R.S., F.L.S., F.G.S., F.Z.S., F.R.E.S., etc., on 20th November last at the age of 87 (a special note was read on the attainments of this distinguished Entomologist); and Mr Edmund Sidney Craske, on 4th December.

The following new members were declared elected:—Messrs Donald Allen, F.R.G.S., F.R.S.A., F.R.E.S., of 698 Warwick Road, Solihull, Warwickshire; E. B. Ford, D.Sc., M.A., of The University Museum, Oxford; G. de C. Fraser, of Warren Mount, Freshfield, near Liverpool; Mrs Sibyl C. Fraser, also of Warren Mount, Freshfield, near Liverpool; Lt.-Commander G. W. Harper, R.N., of Bramblewood, Bushby Avenue, Rustington, Sussex; Commander L. H. T. Hollebome, R.N., of 74 Kensington Court, Kensington, W.8; Col. S. H. Kershaw., D.S.O., of Alderman's Place, Aspley Heath, Bletchley, Bucks; Messrs J. K. Mathews, M.A. Cantab., of Greystoke, Freshfield, near Liverpool; and G. H. B. Oliver, of 152 Amersham Road, High Wycombe, Bucks.

Mr F. V. L. JARVIS exhibited two specimens of *Heodes* (*Lycaena*) *phlaeas*, L. (male and female), which emerged on 10th October last, whose pupae were kept at frost temperature (about 32° F.) from the period when the wing cells began to be laid down. Temperature was gradually raised to produce emergence. Both these specimens (repre-

sentative of a batch) showed marked diminution of black spotting and great clarity of copper ground colour. He also showed two specimens of the same species (both females and also representative of a small batch), whose pupae were kept throughout at an average temperature of 85° F. Pupal stage lasted 5 days, and all specimens showed greatly increased black spotting and reduction of copper scales. This batch was from ova deposited in October 1942, so that both instances belong to the last brood of the year.

Mr B. A. COOPER exhibited the following Heterocera from various Yorkshire localities:—(a) *Sidemia zollikoferi*, Frr., taken at sugar, Kirkstall, Leeds, 27.viii.1939, by A. Kennedy; (b) *Agrotis* sp., which Mr W. H. T. Tams has, so far, been unable to determine, very pale example, taken at sugar, Sandburn, 1900, by A. Smith (? W. Hasett on label); (c) *Xanthorhoe montanata*, Schiff., dark form, Kirkstall, Leeds, specimen taken June 1942 by A. Kennedy; and (d) *Lampropteryx sufumata*, Schiff., ab. *porritii*, Robs. & G., 29.iv.1933, Bishop's Wood, Selby, by A. Smith.

Mr J. FINCHAM TURNER exhibited a very fine aberration of *H. (L.) phlaeas* taken on a Thistle head at Lulworth Cove in August 1939. (See Plate I.)

Mr H. R. LAST exhibited the following Coleoptera:—*Quedius plancus*, Er. (*kraatzii*, Bris.), a very local species, first found at Chiddingfold, Surrey, by Donisthorpe in 1889. He took it again in 1910, but, so far as records show, it was not found again until 1937, when Mr Last took a single specimen at Bow, Devon. Last September Mr Last took two females and one male in the same locality. It comes in Fowler's Section IV, subgenus *Sauridus*, Steph., next to *Quedius scintillans*, Grav., which it resembles in having the two setigerous punctures on the forehead between the eyes, but, besides being larger, it has longer antennae, with all joints elongate. *Mycetophagus quadripustulatus*, L., ab. *antemacularis*, Torre: He took a single specimen of this aberration on fungus on the condemned elms in Windsor Park on 25th September. In this form the two apical spots on the elytra are wanting. Donisthorpe recorded this aberration in the *Entomologist's Record* in 1928 and told Mr Last he had to examine enormous numbers before he found the aberration. Mr Last said he also took an intermediate example, almost *antemacularis*, on 22nd May at Cheam but with a tiny apical dot on the left elytron.

Mr E. E. SYMS exhibited an early pamphlet on " Bugs " dated 1736 and printed for Alexander Cruden at the " Bible & Anchor " under the Royal Exchange.

Dr H. B. D. KETTLEWELL then read his two important papers:—(a) " Temperature Effects on Pigmentation of *Heliothis peltigera*, Schiff., with reference to Pupal Reactions " (see *Trans.*) and (b) " A Manifestation of the Mendelian Law, at a given temperature only, in a brood of *Panaxia dominula*, L." (See *Trans.*). After some very interesting remarks by Mr F. V. L. Jarvis as to the influence of aestivation as

opposed to hibernation, on the inheritance of certain characters, and further discussion, a very hearty vote of thanks was moved from the Chair and carried by acclamation.

8th JANUARY 1944.

The PRESIDENT in the Chair.

The death of Mr W. G. Sheldon, F.R.E.S., F.Z.S., on 27th December last, was announced, also that of a distinguished non-member, Mr L. B. Prout, on 31st December.

It was declared that Mr Harold Edward Hammond, of 16 Elton Grove, Birmingham, 27, had been elected a member.

Some very fine Lantern Slides were shown by the following:—Mr C. Rippon (Hibernating and other larvae, and imagines, to show assimilation to surroundings); Mr W. H. Spreadbury (Botanical); Mr W. J. Finnigan (Botanical, larvae, etc.); Mr J. Fincham Turner (Bats); and Mr E. E. Syms, on behalf of Mr J. de C. Fraser (*Cerura vinula*, L., larvae in various stages and aspects, and a resting imago). A hearty vote of thanks was moved from the Chair and carried by acclamation.

Mr S. N. A. JACOBS exhibited the Tortricid moth *Ancylis comptana*, Fröl., a very common species on British down-land, together with a handsome form of this species from the United States, *A. comptana*, ssp. *floridana*, Zell., from Lakehurst, New Jersey.

Mr A. W. BUCKSTONE exhibited series of *Pieris napi*, L., to show the result of a breeding experiment with larvae fed on Hedge-Garlic and Horseradish respectively, and read the following note:—South says at page 40, "It has been stated that caterpillars fed upon Hedge-Garlic and Horseradish produce light butterflies and that those reared on Mignonette and Watercress produce dark butterflies." By dark butterflies I assume that what are meant are those having the black markings more pronounced than is usual. I have been told however by several lepidopterists that their experience is that larvae fed upon Hedge-Garlic produce more heavily marked butterflies than those reared on Horseradish. I have bred *napi* a number of times but have always fed the larvae upon Horseradish and have certainly obtained a considerable percentage, on one occasion over 50 per cent. faintly marked insects, a few of which are exhibited herewith. In May 1942 I obtained about 200 eggs from a butterfly of the spring form resulting in 190 larvae, of which half were sleeved on Horseradish and half on Hedge-Garlick. During the following July 50 of the Garlic-fed ones emerged as butterflies and 41 of those that were fed on Horseradish, 38 of the Garlic-fed and 44 Horseradish-fed going over the winter as pupae. In the following spring 30 of each lot of winter pupae emerged, the remainder having died. It will be seen by the series of specimens here exhibited that, generally speaking, the Garlic-fed specimens have the black markings distinctly more pronounced than have those that were fed on Horseradish.

Mr L. G. PAYNE exhibited a number of Coleoptera obtained in July last at Dyffryn, N. Wales, by immersing a dead sheep in water, but pointed out that in using this method of dealing with carcasses very great care must always be taken to ensure that no risk is run of contaminating water which might conceivably be used for drinking or domestic purposes. The species shown were *Necrodes littoralis*, L., *Onthophagus fracticornis*, Pk., *Thanatophilus sinuatus*, F., *T. rugosus*, L., and *Saprinus semistriatus*, Scrib. (*nitidulus*, Pk.).

Captain R. A. JACKSON, R.N., reported that he had found *Aegeria andrenaeformis*, Lasp., rather more plentiful than usual about Christmas time. For the first time he found a first-year larva. This had been feeding in a circle just underneath the bark (thus eventually forming the "cap") and had just bored through the stem and entered the pith. It was at the end of December, about 3 mm. in length. He also found what appeared to be another first-year larva, but left the mine untouched for further observation. Other larvae were found about one-third to half grown, and this suggests that the insect may remain three years in its early stages. He also took the opportunity of reminding members that this is the year for *A. flaviventris*, Stdgr. In S. Hampshire this species is decidedly local, occurring in particular areas. The mines have already suffered from the Tits' attention.

22nd JANUARY 1944.

Mr S. N. A. JACOBS, President, in the Chair.

Messrs James Nichol Pickard, Ph.D., M.A., F.R.S.E., of 36 Storey's Way, Cambridge, and Anthony Michael Walton, of 275 Croxted Road, West Dulwich, S.E.21, and Hertford College, Oxford, were declared elected members.

The BARON DE WORMS formally handed over the very comprehensive and well-arranged collection of British *Tortricidae* made by our former member, Mr E. Ernest Green of Camberley, and presented by the collector to the Society as announced at the meeting on 13th November last. He proposed a vote of thanks to Mr Green for his generous gift. This was seconded by the President and carried with acclamation.

Mr J. O. TAYLOR exhibited 21 blown larvae of Lepidoptera, which he offered to the Society. They were accepted and thanks expressed from the Chair.

Mr T. R. EAGLES exhibited (a) a cut stem and several compound thorns of *Gleditschia triacantha*, , a native of Japan, and drew attention to the structure of the thorns, and (b) a flower of *Psammanthe peruviana*, a native of Peru, and drew attention to the way the anthers were carried.

22nd JANUARY 1944.

ANNUAL MEETING.

Mr R. J. BURTON, L.D.S., R.C.S.Eng., President, in the Chair, and subsequently Mr S. N. A. JACOBS, the new President, in the Chair (for the Ordinary Meeting which took place).

Reports of the Council and Treasurer, with the Balance-Sheet, were read and adopted. A hearty vote of thanks to the generous donors to the funds during 1943 was proposed from the Chair, and carried with acclamation.

The following is a List of those members declared elected for Officers and Council during the ensuing twelve months:—*President*—Stanley N. A. Jacobs. *Vice-Presidents*—R. J. Burton, L.D.S., R.C.S.Eng., and Capt. Reginald A. Jackson, R.N., F.R.E.S. *Treasurer*—T. R. Eagles. *Secretaries*—C. N. Hawkins, F.R.E.S. (*Minuting*); F. Stanley Smith, F.R.E.S. (*Corresponding*). *Editor of Proceedings*—Hy. J. Turner, F.R.E.S., F.R.H.S. *Curator*—S. R. Ashby, F.R.E.S. *Librarian*—E. E. Syms, F.R.E.S. *Council*—F. D. Coote, F.R.E.S.; Canon T. G. Edwards, M.A., F.Z.S.; S. W. C. Williams; L. T. Ford; C. Rippon, M.A., J.P., F.R.E.S.; S. Wakely; Mrs F. Stanley Smith; Col. P. A. Cardew; H. W. Andrews, F.R.E.S.; and R. W. Sparrow.

The President then read his Address.

PRESIDENT'S ADDRESS.

It is very gratifying to note from the Report of the Council, which you have just received, that, in spite of the unsettled times, the Society continues to flourish, and has reached a record as regards membership, the previous best year being in 1928 with a membership of 265. However, it must not be overlooked that our present number of 268 contains all our active service members, many of whom are naturally precluded from pursuing their hobby at present.

It is also gratifying to notice from the Librarian's Report that many more books have been borrowed from the Library during the year, which must recompense him in some measure for all the time and trouble he devotes to this cause.

The twelve Field Meetings were, on the whole, well attended in view of the difficulties of the times, and proved well worth the while of those who were able to be present. The value of these meetings lies not so much in the actual captures and observations as in the opportunities they afford for members to get together and compare their methods actually in practice, and to exchange knowledge on the spot.

Death has laid rather a heavier hand than usual on our Society this year, and we have to mourn the loss of eight good members:—

Mr L. O. Grocock, a member of the Society since 1934, whose chief interest lay in Botany, passed away in April.

Mr Alfred Sick, F.R.E.S., whose interest in the Microlepidoptera is so well known, was a member of this Society for 45 years, having joined

in 1898, and occupied the Presidential Chair in 1904. He also died in April.

Mr A. Ford, an even older member, whose connection with the Society dates back for 54 years to 1889, and whose interest lay in both Lepidoptera and Coleoptera, passed away in May.

Sir H. Beckwith Whitehouse, K.T., M.B., M.S., F.R.C.S., the famous gynaecologist and President of the British Medical Association, who had been nominated for a second year as such, died in July. In spite of the heavy calls on his time for his medical services, he found occasion to take a keen interest in Entomology, and became a member of this Society in 1935.

Mr H. Willoughby Ellis, F.R.E.S., F.Z.S., M.B.O.U., a member since 1923 and particularly keen on Ornithology and Coleoptera, passed away in November.

Sir Edward B. Poulton, D.Sc., M.A., F.R.S., F.L.S., F.G.S., F.Z.S., F.R.E.S., a great upholder of Darwinism, particularly in the realm of National Selection. He served as President of the Linnean Society, of the International Entomological Congress at Oxford in 1912, and of the British Association in 1937. In 1933 he was elected Honorary Life President of The (now The Royal) Entomological Society of London, of which also he had been President on three previous occasions. He was elected an Honorary Member of this Society so far back as 1912. He died in November last.

Mr W. G. SHELDON, F.Z.S., F.R.E.S., who had been a member of this Society for 33 years and had only just been made an Honorary Member, whose interest was chiefly centred in Entomology, was taken from us in December, as also was

Mr E. S. Craske, a comparatively recent member who joined the Society in 1935, and whose interest also lay in the Lepidoptera.

As a tribute to the memory of these lost friends, I ask you to stand for a few moments.

May the example of these old friends, who have passed on, serve as a stimulus and encouragement not only to our 22 new members, amongst whom we look for their successors in the future, but to all our members who are already set on the road to the acquirement of more knowledge of our interesting studies.

I have been considerably exercised during the time since you did me the honour of choosing such a tyro as myself to fill this Presidential Chair as to what subject I could talk about to-day. I prefer to try to speak on something I know a little about, and as the only thing I can think of in this line is my collecting experience in North Devon, I propose to entitle my talk

“ COMMENCING A COLLECTION IN NORTH DEVON.”

It was in the year 1929 that my son, then a schoolboy, got the craze that he would like to collect butterflies, so I presented him with the necessary outfit and gave him what help I could. But it was not long before

his craze went the way of most schoolboy crazes and ceased to exist, not, however, before father had got bitten by the collecting bug, from which he has not yet recovered. At first it was a case of finding various suitable spots within collecting distance of Ilfracombe and learning the ropes, and it was not until 1932 that I really got started on proper lines and began to keep proper records and to label all my captures. This was entirely due to my good fortune in making the acquaintance of two keen entomologists, Dr Elliston Wright, of Braunton, and Mr Mervyn Palmer, who had just come to reside in Ilfracombe after many years' collecting in this country and abroad. The former, although not strictly speaking a collector, gave invaluable help with regard to the habits and habitats of local insects, and the latter gave his help in the management of a collection and stressed the need for notes and labels. About that time Mr Palmer, with one or two others, were in the process of founding the Ilfracombe Museum, of which he is still the Curator, and of which he has made a wonderful success, and he roped me in to help with the local collection of Lepidoptera. There were at that time two lists of local Lepidoptera to work on, i.e., Dr Elliston Wright's on those of the Braunton area, 1932, and Dr G. B. Longstaff's on those of Mortehoe, 1907, which between them recorded 454 species. The records now in the Museum contain the names of 502 species, but the district covered by these is much wider and include some very rare visitors, such as the *Lycaena dorilis*, Hufn., taken by Mr Latter in 1887, and the *Papilio podalirius*, L., at Woolacombe in 1901, now in the Rothschild Collection at Tring, both of which probably came off ships passing up the channel. I think it speaks well for the completeness of the two lists I have mentioned that only 48 further records have been added in the past eleven years. I propose, firstly, to take some of our favourite collecting grounds and deal with anything of interest they bring to my memory.

There was a derelict house at Eggesford, originally the property of the Portsmouth family, which during the last war had been denuded of its woods and partly demolished for its scrap metal and other useful material. The woods had been largely replanted in what was, I believe, the first afforestation scheme to be started after that war. It was a favourite picnicking place with us, as there were many gorgeous Rhododendron and Azalea bushes in the spring and fine blackberries in the autumn; and the children loved to play here and explore the old house. You can imagine our delight when one day we discovered *Leptidia sinapis*, L., flying along one of the rides between the young trees; it was never in great numbers and nearly always in the same ride, but we saw it every year up to the time I left N. Devon. One wonders whether it had survived from the old woods or had established itself since from another locality, where it was reputed to occur, about two miles away along the main road. We never found it there although we visited the place once or twice in the hope of finding *Melitaea athalia*, Rott., which was also reputed to be there. Again we were disappointed, although Mr Palmer was more fortunate and did obtain a specimen, when he was

there one day alone. When I first met Mr Palmer in the autumn of 1932 he gave me a number of *Euphydryas aurinia*, Rott., which he had found in large numbers in a single field at Warnscombe Farm just outside Ilfracombe in the previous May. I visited the site the following April to search for larvae, but found none, neither was the insect seen there again, but one was taken at Knowl near Braunton. The following year there were none at either place, but they turned up at Halsinger Bog. This behaviour was rather annoying from the collector's point of view as I did not discover their new habitats until they were too worn to be of any use. The next year they had disappeared again and I have been unable to find them since, but I have no doubt they are still present somewhere around Ilfracombe. One wonders exactly when they migrate and why. Do they go as a body at the end of their season? or do the females only seek a new locality in which to deposit their eggs? Halsinger was another favourite spot for picnicking; here was the only Aspen wood I know of in the district, where we used to collect the larvae of *Orthosia populeti*, Fabr., but never succeeded in bringing them through. Here also *Callophrys rubi*, L., occurs in numbers; in 1942 and 1943 they were reported as being in thousands. Mr Palmer has reported an interesting observation on these; one day at Halsinger he observed a number of them "mobbing" a *Gonepteryx rhamni*, L., like small birds sometimes mob a cuckoo or hawk; one wonders what the reason could be.

Having learnt a little more about Aspens and Aspen feeders through our South London Field Meetings, I paid a visit to this wood and Halsinger Bog when I was in Ilfracombe last September and found to my horror that it was all cut down and Halsinger Down and even the bog was ploughed up.

Dr Wright has recorded in his little book several interesting plants which used to occur here and I very much fear these must have disappeared as well.

This calls to my mind another entomological tragedy, which occurred before the war. The old road from Ilfracombe to Combe Martin began to fall into the sea and a new one had to be cut further inland. What was left of the old road was reasonably safe for foot traffic but soon became wild and more or less overgrown, and here, in August 1934, we discovered *Lygephila cracca*, Schiff. There was a very large clump of wood Vetch, where we found the larvae in the following June, and in July obtained a couple of females, which yielded some 500 ova; these were scattered about the floor of the cage quite loose and none was laid on the food plant. Moths bred from these emerged on 22nd July 1936, but on visiting the locality at that time we were horrified to find that the whole clump of wood Vetch had been buried under a heap of builder's rubble and there were no *cracca* seen that year, nor have I heard of any being seen by anyone else. The books give Wood Sage as being a favourite flower at which to take *cracca*, but it was always over and we found them on other flowers such as Hemp Agrimony and

Golden Rod. We never saw one at sugar, in fact sugar along that bit of road was never very successful.

This reminds me of another place on the other side of the valley, an old bridge crossing the old road from Hele to Berrynarbor and reputed to be haunted by the ghost of a monk; perhaps we may have added to the legend with our lights and waving nets. In 1932 this was covered with masses of Ivy blossom which one night provided us with marvellous hunting. Thirteen different species, including *Aporophyla nigra*, Haw., *Griposia aprilina*, L., and *Omphaloscelis lunosa*, Haw. Light also produced good results here at other times, including *Notodonta anceps*, Goeze (*trepida*, Esp.), *Drymonia dodonea*, Schiff. (*trimacula*, Esp.), *Colocasia coryli*, L., and two *Eilema sororcula*, Hufn., in 1935, a new record for the district. This reminds me of certain other footmen; we have a record of *Lithosia quadra*, L., which is suspect. In July 1933 Mr Palmer, my son, and I motored down to the New Forest for a few days' camping and collecting with certain success. We reached home by mid-day on our return and put Mr Palmer and his baggage down at the Museum. The next morning on going down to the Museum Mr Palmer found a *quadra* sitting on the door. Problem, was it a stowaway? We did not take one in the Forest, but saw one and missed it. Was it this specimen, and did we get it after all?

Each year I searched the Cliffs at Branton for larvae of *Eilema caniola*, Hb., which Dr Wright had taken there, but I never had any success. Probably conditions were not just suitable: I believe sun following a shower is the ideal. I shall always remember my introduction to *Mitochrista miniata*, Forst., in August 1932, when they came to light in clouds on Branton Burrows, but being very raw, I ignored them as being some form of Micro and only took a couple, because they were so beautiful. It took quite a long time before I completed my series. It has struck me that many of the Footmen seem to approach light very gingerly. These *miniata* would not come right up to the light, but had to be caught some way down the lane. My *sororcula* suddenly appeared sitting on the lamp, I never saw them come. Some *Atolmis rubricollis*, L., we took at Arlington one night were found sitting on a wall near the light and did not come right up to it. We have noticed this with many other species, which we had to go and fetch instead of waiting at the lights; thus, speaking from memory I can recall *Deilephila elpenor*, L., *Actebia praecox*, L., *Nonagria typhae*, Thnbg., *Rhizedra lutosa*, Hb., the last also a new record for the Burrows.

And this brings me to our most delightful hunting ground, Branton Burrows; the wonderful evenings we spent there will never be forgotten. The sound of the Plover, the drumming of the Snipe, the Grasshopper Warbler in the distance, the Bats hovering overhead, and Moths innumerable: we often recorded 20 different species in one night. And it was nearly always all ours, no gamekeepers, no inquisitive boys, no policemen, friendly or otherwise, and no courting couples, who in other parts probably cursed us far more than we cursed them, and only once

did we meet any fellow collector, a member of this Society, Mr G. Cole, who had the great good fortune to add that rare visitor, *Apamea zollikoferi*, Freyer, to the Braunton list in September 1934. I heard from him three years later that he had also added *Mythimna turca*, L., and *Semiothisa alternaria*, Hb., to Dr Wright's list, in 1935. Dr Wright's list is so complete that I do not think I can add anything to it except to mention in passing the few additions that came our way since it was published. There were only two that we found in any numbers, i.e., *Ectypa glyphica*, L., and *Mysticoptera sexalisata*, Hb.; four others were only a single specimen of each, i.e., *Antitype chi*, L., *R. lutosa*, *Calocalpe cervinalis*, Scop. (*certata*, Hb.), and *Aegeria formicaeformis*, Esp., although I can see no reason why they should not be established there. We also saw *Hepialus sylvina*, L., in some numbers not far away at Saunton in August 1936.

I think perhaps I might here intersperse a few rambling reminiscences of the Burrows. That night of 30th May 1935 when we had six *Sphinx ligustri*, L., sitting around our sheet at the same time and similar numbers of *Smerinthus ocellata*, L., and *Laotoë populi*, L., large numbers of *Notodonta ziczac*, L., *Pheosia tremula*, Clerck, and *Pterostoma palpina*, Clerck, also came along. *Tremula* is interesting as Dr Wright makes a note in his list "not recently." They were there all right again this night. Other insects that came to light that night were *Rusina umbratica*, Goeze (*tenebrosa*, Hb.), *Dasychira pudibunda*, L., *Procus fasciuncula*, Haw., *Biston betularia*, L., *Callimorpha jacobaeae*, L., *Phalera bucephala*, L., *Anagoga pulveraria*, L., *Calostigia didymata*, L., *Euphyia ocellata*, Hufn., *Eupithecia centaureata*, Schiff. (*oblongata*, Thnbg.), *Semiothisa notata*, L., *Dysstroma truncata*, Hufn., *Xanthorhoë montanata*, Schiff., and *X. ferrugata*, Clerck. Sugar was not very productive, only *Caradrina morpheus*, Hufn., *Hadena v-latinum*, Hufn. (*genistae*, Bkh.), and *Agrotis puta*, Hb., turning up, the last interesting as appearing so early in May when we usually expected it in August. Whilst on sugaring, I might remark that in North Devon there are very few trees suitable for sugar and the greater part must be done by other means. Posts, foliage, rags hung on bushes and brown paper pinned on telegraph poles have all proved successful. My *chi* was on brown paper. As a lover of trees I prefer these methods as all traces can be removed and no ugly stains are left on the tree trunks. Another warm night in June we observed assembling taking place at the top of a big willow tree and were interested to know what the insects were. Numbers of fair-sized moths were dancing up and down, in and out, all over the top of the tree; my son eventually volunteered to climb up and try with my long handled net to get one; finally, by throwing the net at one of the insects he managed to procure it and we were able to rescue the net before the moth could escape on reaching the ground. We were surprised to find that they were *Hepialus humuli*, L., as we were under the impression that these paired near the ground and that the white of the male actually attracted the females to them in contradistinction

to the methods of pairing by other species, in which we were obviously mistaken.

The abundance or otherwise of various insects is a problem on which it is very difficult to express an opinion from a few years' collecting. As a beginner, one is apt to label as common certain insects of which one takes a large number in any one year, only to find on looking back through one's records, that it has never been seen since, but this kind of experience is quite likely due to there being only a short period of emergence and a short life on the wing, and one's time of collecting does not quite coincide with the time of emergence. I remember one night on the Burrows in a miserable drizzle, which drove us home, it positively rained (in addition to the wet sort) the Salterns form of *Hydraecia ocula*, L. (*nictitans*, Dup.) named *paludis*, Tutt, which came to our headlights when we stopped for a moment. We took a few, but it was so wet, we decided to leave them for another time, and have never seen any since.

Talking of "raining" insects, there was another night, when *jacobaeae* came to the lights in hundreds, but there were very few other insects. That year was, as one would expect, remarkable for *jacobaeae* larvae which swarmed all over the place much to the displeasure of picnickers, who naturally objected to having them mixed up with the tea. In fact the numbers were so great that they completely destroyed one large patch of ragwort, the flowers of which we used to work, to such an extent that it completely disappeared the following year, but has re-seeded itself since, to the old quantity. But there were very few imagines about following this glut of larvae, largely due, I think, to parasites as many of those I collected were parasitized, but also, I think, in part to partial starvation which weakened them for passing the winter.

Then on the other hand there were some insects which were extremely local. Dr Wright mentions the *Nonagria geminipuncta*, Haw., which bred in an extremely small area of reeds near where the Black-headed Gulls used to nest every year, and we used to take *Eustrotia uncula*, Clerck, fairly regularly in another small area of sandy marsh not more than 100 yards long. We used to kick these out together with a large micro from which they were almost indistinguishable when on the wing, so we had to net both and it usually worked out at about 20 micros to each *uncula*.

Now, of course, I must refer to the special sand-hill insects which turn up on the Burrows. The really common ones which came in numbers to sugar every year were *Agrotis vestigialis*, Hufn., and *Euxoa tritici*, L., *A. puta*, *Euxoa cursoria*, Hufn., *Peridroma porphyria*, Schiff. (*saucia*, Hb.), *Heliophobus albicolor*, Hb., and *Craniophora ligustri*, Schiff., turned up regularly most years, but not in large numbers. Others, such as *Agrotis cinerea*, Schiff., *A. lunigera*, Steph., *A. ripae*, Hb., and *Actobia praecox*, L., only rarely.

Of course you will have realized that I have made no reference to the insects, which turn up commonly everywhere, such as our old friends *Apamea monoglypha*, Hufn., *Amathes xanthographa*, Schiff., and *Agrotis exclamationis*, L. One night in June 1935 we counted no less than 80 of the two latter on two small patches of sugar; one could not see the sugar for moths.

Very early in our collecting career we discovered the uselessness of trying on a moonlight night but I am not satisfied in my own mind whether this is due to the light or to the weather which so often seems clear and cold at night with the full moon, and how often the weather changes with the moonless nights, and becomes wet and stormy and far from comfortable for collecting.

Talking of years of plenty, one remembers the *Colias croceus*, Fourc., on the Burrows in 1929 in a meadow near the Pill, when I saw the largest number I have ever seen, nearly all males, and no var. *helice*, Hb., were noticed amongst them. And in 1933, the *atropos* and *convolvuli* year; incidentally this year seems to have been an outstanding year for many insects. One *Acherontia atropos*, L., was taken in May on the Capstone in Ilfracombe, in poor condition, but between 1st September and 8th October 30 specimens were recorded from the district, either bred from larvae or pupae obtained from the potato diggers, or taken as imagines. The bred ones were all forced by being kept in damp warm spots according to the facilities at the disposal of their owners; most were brought through in a bakehouse! Between the same dates nine *Herse convolvuli*, L., were recorded from Bicklecombe Park, Ilfracombe, flying over clumps of *Nicotiana*. I fear some of these clumps suffered somewhat at our hands, but I hope the gardener was not too cross about it in the mornings. A few have been recorded most years since, but no larvae have been found except that recorded before this by Dr Wright. It was rather interesting to note that in this year of abundance there was a marked scarcity of *Phlogophora meticulosa*, L., which in previous years had been most abundant especially at ivy-blossom. There was also another interesting capture this year, a perfectly fresh *Lygephila pastinum*, Treit., at ivy-bloom, on 15th October, I should imagine almost a record late emergence. Another late appearance this same year was a *Hypena proboscidalis*, L., on 29th September, rather a small specimen and the only one I have found so late in the year.

Dealing with the other Hawk Moths, of the commoner ones I think *Mimas tiliae*, L., was least frequently seen, anyhow in Ilfracombe; *elpenor*, *ocellata*, *populi* and *ligustri* were comparatively common and came to light more or less freely. *Deilephila porcellus*, L., was occasionally taken over flowers of Viper's Bugloss on the Burrows, but we never had one come to light. *Macroglossum stellatarum*, L., probably visited us as frequently as in other parts of the country, and one year Mr Palmer watched a female ovipositing on bedstraw and bred the larvae in the Museum. One *Celerio livornica*, Esp., was taken in Ilfracombe

by Mr Kingsley Trebble in June 1931, and Dr Wright recorded four in the same year, but, much to my surprise, I did not hear of any having been seen there this year in spite of their prevalence in other parts of the country. There is one record of *Daphnis nerii*, L., taken by Capt. G. K. Hibbert, of Berrynarbor, in September 1909. Whilst on the rarer insects, the *Utetheisa pulchella*, L., recorded by Dr Wright in Braunton in 1929 is worthy of note. I have a specimen, which came from an old collection made in the district, but, unfortunately, it was unlabelled. The presumption is that it was local. I seem to have drifted naturally away from the Burrows, so will let my memory turn now to the Spreacombe district, which is a delightful wild area around Spreacombe House, about four miles out of Ilfracombe on the Braunton Road. It is reached by a real Devonshire lane bordered by thick masses of ferns and foxgloves. This was a favourite Easter haunt of ours when we could always be sure of seeing *G. rhamni*, accompanied by *Nymphalis io*, L., and *Aglais urticae*, L. Here also we found *Thecla quercus*, L., each year but not in any great numbers and the trees were too high to reach them or to beat for larvae, a very tantalizing position for us. I did try tying a broomstick to my net handle and standing up in my car to see whether I could reach them, but it didn't work very well.

Then in an orchard up through the woods we could always obtain the earlier skippers, *Pyrgus malvae*, L., and *Erynnis tages*, L., and occasionally the small fritillaries, *B. (Argynnis) euphrosyne*, L., and *B. selene*, Schiff.

Along this lane we also used to find the larvae of *Gortyna flavago*, Schiff. (*ochracea*, Hb.) in July, as also in certain other places around Ilfracombe. They are easy to find, as in N. Devon they feed inside the stems of foxgloves, so that if one sees a foxglove with its head sadly drooping and looking very sick it will almost certainly contain one of the larvae. If the stems are cut off below the ground, the hollow openings stopped up with cotton wool, and the end stood in a little water, the larvae will continue to feed and finally pupate inside the stem and emerge a fortnight or so later. There is no difficulty in inducing them to enter a fresh stem if necessary if a sufficient space is first bored out at the base, the larva put in and the opening packed with cotton wool and placed in water. In fact, I usually gave them fresh stems for preference, as I was sure then they would have enough food. About six inches of stem is enough.

Continuing the walk up Spreacombe Lane, past an old derelict iron mine, one could cut across country to Heathercombe at the western end of Woolacombe Sands; here could be obtained *Plebejus argus*, L., and *Argynnis cydippe*, L., and in the lane leading down to the beach *Aphantopus hyperantus*, L., was quite common. A walk back to Woolacombe, either along the sands or the road past the Golf Links, brings one to tea and a 'bus back to Ilfracombe.

Of the Fritillaries not so far mentioned, *Argynnis paphia*, L., occurs in the Hunter's Inn district and at Wembworthy (a favourite trip of

ours but not quite N. Devon) and *A. aglaia*, L., also at Hunter's Inn, Braunton Burrows, and other localities sometimes in fair numbers.

The mention of Hunter's Inn reminds me of Easter 1930, when the place was strewn with the larvae of *Arctia villica*, L. I packed all I could into what match-boxes our party possessed as I had no collecting appliances and, being very fresh, did not know what they were and consequently what they ate. After trying a number of plants, I found they took to Stonecrop, a lot of which grows at Hunter's Inn, and I raised them successfully on this.

It might here be of interest to mention that *Satyrus galathea*, L., occurs in the district, but only in a few very small colonies as far as we were able to discover, more in the direction of Barnstaple on the Muddiford road and not in the Braunton direction, but there was a large colony at Wembworthy. *Vanessa cardui*, L., used to turn up in waves most springs and used to breed on the thistles around Mullacott Cross just out of Ilfracombe. One wondered why one could usually find the larvae here in preference to other parts; it seems almost as though the butterflies returned, like the swallows, to their original breeding grounds; maybe, though, there was something in the surroundings which was just right and attracted fresh visitors each year. The Muddiford and Arlington areas towards Barnstaple gave us different hunting; it was more wooded but it was only possible to work with lights from the sides of the roads, as we were not able to get access to the woods. The best insects to turn up here were:—*rubricollis* as mentioned earlier, *anceps* (*trepida*), *Lophopteryx capucina*, L. (*camelina*, L.), *Tethea duplaris*, L., *Drepana falcatoria*, L. (*falcula*, Schiff.), *Bena prasinana*, L., *Hipparchus papilionaria*, L., *Mesoleuca albicillata*, L., *Cleora lichenaria*, Hufn., *C. jubata*, Thnbg., *C. ribeata* Clerck. (*abietaria*, Hb.), *Ectropis extersaria*, Hb. (*luridata*, Bkh.), *Semiothisa liturata*, Clerck., and *Angerona prunaria*, L. (a semi-banded form occasionally turning up).

Another place where good hunting was sometimes to be had was a small group of trees between Woody Bay and Lynton, which gave the best sugaring we were able to obtain. Woody Bay itself was impossible, as the owner would not permit any cars nor any strangers to stop on the roads in what he claimed as his property. Here we used to obtain *Asphalia diluta*, Schiff., *Lampra fimbriata*, Schreber (*fimbria*, L.), and *Amphipyra tragopoginis*, Clerck., and one year a colony of the larvae of *Orthosia miniosa*, Schiff., with which we were rather pleased.

Many visits were paid to the Torrs Walks at Ilfracombe in the hopes of finding some of the rarer larvae or insects such as *Hadena andalusica*, Stdgr. (ssp. *barrettii*, Dbldy.) or *Antitype xanthomista*, Hb., but without success. It was not until I returned to Ilfracombe on a visit since that I obtained pupae of *barrettii* and that was on the other side of the town near Hele. Possibly the situation here is warmer than on the Torrs Walks, although the amount of Sea Campion is infinitely less, or I may just have been unlucky. Another larva we especially sought was *Cucullia*

absinthii, Clerck., which was known to occur locally. There were only two places we knew of where Wormwood was to be found, one near Lee and another at Trentishoe; these we visited for several years. The Trentishoe lot was usually cut down before any larvae could have become full grown, so probably they never obtained a footing here. Although we had no success with *absinthii*, I found one larva which proved interesting at Lee feeding on the Wormwood and that was of *Plusia gamma*, L., but this was, I should think, an abnormal foodplant, as it produced quite a small imago in September. I have bred this insect once only since and this emerged in October from a pupa found on Brauntton Burrows, although the usual crowds of immigrants turn up most years.

Another larva I always hoped to obtain was that of *Leucania putrescens*, Hb., but as this necessitated searching in November in the Groyde area, and, since I learnt of its habitat, there was a succession of very cold Novembers, I never got over there before leaving the district. Dr Wright told me they were to be found on a certain fine grass after dark and would not pupate until the late spring, although they would not feed after December or January. We tried most years to attract the imagines with light, but had no success.

I do not think this paper would be complete without some reference to our trips to N. Cornwall after *Maculinea arion*, L., not so much because of any great success obtained, but because of the most enjoyable day's outing it gave us. It was always the last Saturday in June that we selected for this trip, and the weather was always perfect. We used to motor down to the neighbourhood of Millhook, of which there are at least three different spellings on the signposts in the neighbourhood. Probably some of you who have been there know the spot with the quaint noticeboard, "Anyone catching flies on this ground will be liable." Liable to what was not specified, and if we had had any paint I think we should have added "liable to catch large blues!" It was never possible to get down before middle day which possibly accounted for the fact that we never saw more than two on any one occasion, although only once we drew a complete blank. One time we were directed to the valley in which they were supposed to be preserved and walked right through it without a sign of one, but on returning to the old place obtained a couple. A picnic lunch alfresco and later a cream tea at the inn on the main road and the trip home in the evenings made very memorable days.

I should now like to switch from localities to one or two remarks on various observations and captures, which interested me whilst in N. Devon. The life-history of *Lasiocampa quercus*, L., var. *callunae*, Palmer, has puzzled me a little. If one finds the larvae in the spring they will either spin up by the middle of June and emerge the same year after about a month in the pupal stage, or they will spin up in July or August and go through until the following July (one emerged in May). One spring I found two larvae, one quite small, before it had lost its

reddish markings, and another much larger one. The small one grew very slowly and went through another winter before spinning up, the other spun up and emerged the same year. I wondered whether those larvae which spun up early and emerged the same year had actually spent two winters as a larva, but as I left N. Devon about the time this idea occurred to me, I have had no opportunity of following the matter further, and I only had experience of 10 larvae, 6 of which emerged the same year and 4 spent the winter as pupae, sex making no difference.

Then there was that exciting time in 1933, when I saw my first *Polygonia c-album*, L. This was in a friend's garden at Topsham, S. Devon, in September, feeding on rotten apples. I obtained two and saw two others. The following May they had reached N. Devon and on the first of this month I took a worn specimen in the Bray Valley, this was interesting in so far that, although I missed it three times, it kept returning to exactly the same damp spot of road about every ten minutes until captured. On 21st July they were plentiful in the same garden at Topsham, and are now quite common in Ilfracombe and can be found sitting on the ivy outside the Museum door. Larvae of *Vanessa atalanta*, L., have also been taken feeding on Pellitory-of-the-wall quite close to this same door. One year I planted out a brood of *Cerura vinula*, L., on a small poplar in the garden, and was interested to notice that when quite small and black they seemed to make no effort to hide themselves but lay quite openly on the upper surface of the leaves, but the numbers got visibly less, and by the time they were full grown only three could be seen, search how we would; finally, these were devoured by sparrows. Had I not seen them myself I should not have credited that these birds could have managed such a large insect, but they made such a fuss and a quarrel about it that I went out to see what it was all about and caught them in the act. It was no tragedy from the collector's point of view as we had already bred one generation and taken what we wanted.

I have only heard of one larva of *Stauropus fagi*, L., being found in Ilfracombe, but as there is not much beech about, this may account for it. It pupated all right but never emerged. There was also a larva of *Apatele alni*, L., brought into the Museum a couple of years ago feeding on rose. This also pupated and then was devoured by some undiscovered parasite, much to the Curator's annoyance. Dr Wright gave me two of these moths, which he had taken in 1933 near Braunton.

Now it is time that I closed and I do so with the hope that you have not found my rambling reminiscences too long nor too boring, and that to those of you, who do not know the Ilfracombe district, I may have said something to encourage you to pay it a visit and see whether you can add some fresh records to the local list. If you should find anything of interest, Mr Palmer at the Museum would be only too delighted to have news of it.

Mr Stanley N. A. Jacobs, the *President* elect, was then inducted to the Chair. After thanking the Society for the honour they had con-

ferred upon him, Mr Jacobs proposed a vote of thanks to Mr Burton for his Address and for his services to the Society throughout the past year and asked permission for the Address to be printed in the forthcoming *Proceedings*. Mr Burton replied and assented to the request.

A vote of thanks was then proposed, by the retiring President, to the other Officers and Council, with special references to the Treasurer, Secretaries, Editor, Curator and Librarian. This was seconded by Mr W. J. Finnigan and carried by acclamation. Mr Eagles replied on behalf of the recipients.

REARING OF LEPIDOPTERA.

By C. RIPPON.

Read 13th May 1943.

I feel it is rather presumptuous of me to talk about the rearing of Lepidoptera to a body of experienced entomologists. That I am actually doing so is due to the persuasive ability of the programme secretary, to which I succumbed in a weak moment. I am, however, somewhat encouraged by the complimentary references made by Mr Littlewood recently in *The Entomologist* regarding some articles on the rearing of larvae, which I wrote for that periodical over twenty years ago. If there be anyone here who happens to have read those articles I fear he may find me repeating some of the points then made. I quite appreciate that any devices I may describe for successful rearing may be nothing new, though I may have originally devised them out of my own inner consciousness. I find, however, that I am always learning something fresh from other collectors, so it is possible that some of my devices may be helpful to some of the members present.

I do not propose to attempt to deal with rearing in detail, for anything approaching a comprehensive treatment of the subject would be impossible in the time at my disposal this evening; I intend, therefore, to confine my remarks to just a few points which are most likely to be of interest. It may be noted that I frequently use expressions such as majority of, many, some, most, etc. I use these qualifying adjectives advisedly, for generalizations are dangerous, and treatment which is essential to success with one species may be absolutely disastrous to another. I will give just one example. For the majority of burying larvae slightly damp pupating material is essential, for if it is quite dry they roll about on the surface and ultimately perish. Now with *Cucullia lychnitis*, Ramb., the opposite is the case; if the material is at all damp the *lychnitis* may go down and even form their cocoons, but the greater portion will never turn to pupae, while if the larvae are given absolutely dry material, like silver sand, over 90% will be quite all right. It all points to the fact that the habits of the different species and their usual habitats in nature require to be studied to get really successful results, and my definition of the word successful is the obtaining of at least 70% of perfect insects of full size.

The methods of obtaining ova, larvae and pupae from the wild are known to all field workers, but I have met several collectors who find it difficult to induce females to deposit their ova. For the majority of Heterocera I have found a good sized chip box most useful with a hole made in the lid to take a small piece of sponge, moistened with syrup, which can be damped from time to time, without opening the box, and another hole in the centre of the bottom, through which can be pushed

the stem of a small sprig of the food plant bearing one or two small leaves; the box can then be stood upon a wide-mouthed bottle or jar so that the end of the stem is in water. A bit of dry sponge or bark can be introduced into the box for those species which deposit their ova in interstices. I attach great importance to a portion of the food plant being present in the laying box as many insects seem to have the faculty of recognizing their right food plant and will only lay on or near it. Some females deposit ova within an hour or so of pairing, but some of the Noctuae especially are a long time thinking about it. *Tiliacea aurago*, Schiff., is very slow. I have known a female of that species wait over a fortnight or three weeks before laying. An additional refinement, in using the chip box, is to place a collar of paper around the inside walls of the box so that an insect which will lay on the sides will place her ova on the paper, which can afterwards be removed, making the ova more easy to handle for hatching and possibly saving the destruction of the box. Of those which have come my way, only one species has so far defied my efforts to obtain ova, and that is *Dicycla oo*, Linn.; I have had at one time as many as six females kept for laying and being given every sort of inducement I could think of, from screwed-up tissue paper to creviced oak bark, but not a single egg could I obtain, though I kept them alive for some three weeks. For this and other reasons I think this species would well repay some further research into its early stages.

Before leaving the subject of ova, it would be well to point out a rather interesting fact, viz., that the last lot of ova laid are apt to produce weak larvae. There is no doubt that in many more species than is usually thought pairing of the same female takes place more than once, I have known a female of *Tethea ocularis*, Linn. (*Palimpsestis octogesima*, Hb.) pair three times, laying a batch of ova after each pairing, all batches producing healthy larvae, while ova from this species laid after only one pairing, I have found distinctly scrappy in hatching, except for those first laid.

As to the treatment of newly-hatched larvae, I at one time favoured a glass-topped metal box, but a few years ago I got hold of a sample of very fine muslin and a small bag made of that is a distinct advance on the metal box, as the stem of the food plant can be put in water and the foliage kept fresh, so that there is no need to interfere with the newly-hatched larvae until they have changed their first skin, or in some cases their second. I do not propose to go into details about different kinds of cages for larvae, beyond saying that there is a great advantage in having a large number of different sorts and sizes so that the most suitable in capacity and type can be used for the particular species to be reared. For instance, bush and tree feeding larvae mostly do best in tall, light airy cages, while low feeders should have shallow cages which need not have any glass in their construction unless required for inspection. Glass cylinder cages are generally the most suitable for the larvae of very small species, as also glass-topped metal boxes. Then

sleeves both for indoors and outdoors are almost indispensable, and here, I should like to emphasize their value for indoors, as I do not think they are so generally used in that way. As to the number of larvae which can safely be reared in a certain sized cage, that again depends on the species, whether they habitually live in community, use 2 or 3 leaves for habitats, or are generally found singly and are of a fleshy, soft description. Anyway, for the best percentage pupae results not more than 30 to 40 larvae should, in their last instar, be kept in the same receptacle, whatever the size of the larvae or cage. Overcrowding is undoubtedly disastrous, but exactly why it is difficult to say; it is not entirely a matter of air, as proved by the ease with which a few larvae even of fair size can be reared successfully in a tightly fitting metal box. The food question is perhaps the biggest of all, and the most important, for nearly every species needs special treatment in this matter. The only generalization which can be made is that the majority of larvae do best when given the youngest growth in their very early stages, more mature as they get older and the most mature in their last instar, for instance, a flower- and seed-eating species starts with the flowers, goes on to the young green seeds, and finishes on hard, nearly ripe seeds; the same with leaf eaters—to give *Apatele* (*Acronicta*) *aceris*, Linn., young leaves in their last instar would be fatal. In this connection it may be pointed out that it is most important for all young larvae, and especially for those just hatched, that the food should touch the top of the receptacle in which they are contained, for nearly all young larvae travel upwards, which in nature would bring them to the end of the branch where the youngest foliage is. It is often to be noticed in woods that certain trees have their foliage much eaten, while others of the same kind are hardly touched. Food should not be picked from an uneaten tree, and it sometimes contributes to success to use foliage from the same tree or plant throughout the rearing of a particular batch of larvae. I fancy a good deal remains to be discovered as to the real food plants of many species, for in some cases the food plants generally accepted are undoubtedly merely substitutes, hence the difficulty in rearing. When looking up an authority for food plant it is to me like “a red rag to a bull” to see the words knotgrass or low plants. Why the authority cannot say plainly he does not know the right food beats me. Almost worse even than that is when the wrong food plant is given, because the *ipse dixit* of some previous writer has been repeated without corroboration. In this connection I had quite a game many years ago with *Xanthorhoe quadrifasciata*, Clerck (= *Coremia quadrifasciaria*, Linn.) which I wanted particularly to breed, as about the only way to get males. All the authorities I consulted (it was before the issue of Newman & Leeds excellent work) either gave plants which *quadrifasciaria* would not look at or took refuge in stating low plants. I carefully studied the spot, where the moth was most numerous and then, by trial and error of the most likely things growing there, discovered their partiality for violet. On this plant I successfully hiber-

nated and bred the insect, but there was one snag, the imagines were small. Thinking it was highly probable that the larvae changed over to something more succulent in the spring, I tried further experiments and found that after hibernation they revelled in chickweed, and the resulting imagines were if anything a bit larger than in nature; so all was well. If those interested in rearing larvae would carry out somewhat similar investigations, whenever they can, a great deal of useful information would be acquired as to the different things certain species will eat and on which particular one or combination they do best; also some light might be thrown on the reasons for the rarity of certain species.

Temperature undoubtedly has considerable influence on successful rearing. Much better results will be obtained with spring feeding larvae if an even temperature can be maintained night and day; not a high temperature, but something about 60°. Very cold nights in late spring probably kill numbers of larvae, or so reduce their vitality that they never come to maturity. Nearly all living things have difficulty in recovering from a serious set-back when young, and there is no reason to suppose that Lepidoptera are any exception.

Hibernation is a department of rearing on which it would be easy to compile a pretty lengthy dissertation, but a brief reference here must suffice. After trying all sorts of schemes for getting different species through the winter, I have come to the conclusion that with many a very simple treatment is best. On one occasion I took a lot of trouble to provide a certain batch of larvae with growing food plant, etc., but accidentally left one lot in a muslin sleeve with nothing but the withered leaves from their last food supply. Every one in that sleeve came through against only about 40% of those so carefully treated. A great many do, however, need something to nibble occasionally during the winter. Damp with its tendency to mould is far and away the greatest stumbling block to success. For those larvae which hibernate sitting on twigs, a handful of "wood wool" is very useful, forming a dry perch with no fear of mould.

The treatment of pupae is always a debatable question, but personally I have found it much the best, wherever possible, to remove pupae from their cocoons whether above or below ground, especially the latter. Those which do not emerge for some months are then put with a little moss, to prevent too much rolling about, into a silk lined glass-topped metal box and kept in an outdoor temperature in the dark. Of course, there are a number of species whose pupae *must* be kept *in situ*. Included in this category are all those with very hard cocoons, such as *Cerura* (*Dicranura*) *vinula*, Linn., and the *Lasiocampas*; all which pupate in stems or wood, such as *Apatele* (*Acronicta*) *alni*, Linn., and the *Aegeriidae* (*Sesiidae*); and all which rest, i.e., do not pupate till just before emergence, such as the *Xanthias*. To disturb any of these classes after the larvae have finished feeding is generally fatal. About a fortnight before emergence is expected the pupae can be placed in

trays lined with dry moss with a covering of the latter and placed in the emerging box. My emerging boxes are fitted with a false bottom of perforated zinc, below which is a zinc drawer filled with sand which is kept thoroughly wet during emergence periods. In this way a damp atmosphere is maintained in the box without the pupae coming into contact with anything wet. This damp atmosphere I have found the best preventative of breeding cripples. As to removing pupae from their cocoons, some contend that to take out such things as *Arctia caja*, Linn., from their cocoons is asking for trouble. All I can say is that with a recent batch of *caja* out of 104 pupae so removed I had 103 emergencies, all perfect specimens except two. Had I left the pupae in their cocoons, several spun one on top of the other, I doubt if more than about 2/3rds would have got out at all, let alone the number which would have been hopeless cripples.

Mr Littlewood's exhaustive articles on rearing, which appeared in *The Entomologist* in 1941, interested me very much. I thought them excellent and agreed with nearly everything he wrote. I fear, however, that some of the methods he advocated, good though they may be, are too elaborate for the average busy man to find time to carry out. There was, though, one point he made concerning pupae, on which I slightly differ and that was that he deprecates any covering for the pupae before emergence, on the ground that in nature they have no weight above them. My contention is that a layer of moss over the pupae is most desirable as it takes the place of the earth above the buried pupae and the silk around the above-ground pupae, so giving the insect something to push through and thus prevent the empty pupa case sticking to the moth and spoiling it as a specimen. The moss covering should, of course, not be pressed down or be very thick, so there is no real weight on the pupae.

Ichneumons, as every one knows, are the bug-bear of the entomologist, who tries to rear larvae collected wild, but it is unwise for anyone to run away with the idea that if he rears from the egg his broods are necessarily safe. Two or three years ago I had reared from ova two batches which promised interesting results. Everything had gone well and I had a nice lot of pupae, but not a single moth emerged. A Chalcid, *Pteromalus puparum*, being small enough to get through perforated zinc, had got amongst the pupae and destroyed the lot.

In conclusion, I should like to lay stress on the great importance of periodic sterilization of everything (except, of course, the food) with which the larvae are likely to come into contact: cages, boxes, pupating material, moss, everything. The best thing to use is boiling water, only do not leave the moss in it too long or it will get cooked. A good scalding is sufficient.

NOTES ON THE SESIIDAE.

By Capt. R. A. JACKSON, R.N., F.R.E.S.

Read 10th June 1943.

The family with which I am to deal this evening is perhaps the most neglected of any, and when I found that I was far from alone in my ignorance of many of the species I came to the conclusion that something must be done about it.

Few writers have much to say about the best methods of obtaining Clear-wings; little is to be gleaned about them from the entomological magazines, and some of the observations in Tutt's *Practical Hints* are definitely misleading. For a year or two prior to the war I had turned up all the notes I could, but they had not led to much success in the field. Then one day I was in Southampton, when a collector showed me some *Aegeria spheciformis*, Schiff., that were then emerging. Clear-wings were well represented in his collection, and as many of them were from my own neighbourhood, I felt that I must give up reading and rely on my own efforts, although I am much indebted to our member, Mr Fassnidge, for many useful hints regarding how to find the larvae.

I do not know why it is, but to me there is always a thrill in getting Clear-wings, perhaps because for so long I was so woefully ignorant of them.

The object of this paper is to touch upon the subject of collecting and to give such hints as I can concerning methods of procedure.

There are then three methods of obtaining the *Sesiidae* for one's collection:—

- (a) Visits to Messrs Glendining, or to Covent Garden, probably the quickest and cheapest method but one that does not appeal to all.
- (b) Collecting the imagines in the field—practicable and profitable for some species, but giving little hope in many cases.
- (c) Finding the larvae or pupae and breeding the perfect insect.

In my opinion, this last method is by far the most satisfactory in the majority of cases, though not always practicable.

I will deal later with each species in turn, but it may be useful to describe now the tools required by the Sesiid hunter, and I am convinced of the soundness of these recommendations by the fact that a well-known and very able collector came over to me last year and produced from his car almost an exact replica of my own set of tools. These consist of the following articles:—A pruning saw, with two blades, one normal and one of the cross-cut type; a pair of heavy secateurs, a stout chisel and hammer, and a small garden fork or trowel—preferably the latter. Here I would stress the advantage of keeping the saw and trowel sharp—few

who have not tried it can realize the fatigue of using a blunt saw on a stump close to the ground, with one's body in the most uncomfortable position possible. Here also I would advise *Sesia* hunters to leave their spaniels at home—when busy over a stump the affectionate animal, which either comes to love you or to roll on the object of your attention, is never a real help, however charming as a companion at other times. Now, being armed to the teeth and without a dog, let us consider the various species, fifteen only occurring in this country out of over 100 in the Palaearctic region.

In view of the fact that only a few years ago Mr Fassnidge introduced *Aegeria flaviventris*, Stdgr., to the British list, it may be that one or two more are waiting here in obscurity for their discoverer. In this connection I would call attention to the remarks of Mr Turner in the *Entomologist's Record* for 1926, p. 115, when he besought collectors to keep their eyes open for other species, such as *Bembecia hylaeiformis*, Lasp., which feeds in Raspberry.

To turn then to the question of collecting, the first two species to be dealt with are the large Hornet Clear-wings, *Sesia apiformis*, Clerck, which feeds on Poplar, and *Sphacia bembeciformis*, Hb. (= *crabroniformis*, Lewin), more commonly found in Sallows and Willows.

S. apiformis feeds chiefly in the roots of Poplar and is difficult to obtain as a larva—it is chiefly an Eastern county species, and the imago is to be found on sunny mornings on the leaves and stems of large Poplars. Some interesting notes concerning full-fed larvae under Poplar bark by Dr Cockayne are contained in the *Entomologist's Record* for 1933.

S. bembeciformis, Hb., is much easier to obtain and should be searched for when woods are being cut. The mines are easily seen in the cut stems, and if a larva is present it will cover up its exit hole in a few days with a plaiting of straw-like material, as in the example exhibited. The larvae are generally in the part of the stem which has been cut off, and when the end of a mine is found, which has been sealed over, the stem should be cut off about a foot above. If the larva is in the stump, it will seal off the top of the gallery, when the stump itself must be sawn off as low as may be. Kept in damp sand, exit upwards, the moths emerge in June about the 12th-15th.

The next species we come to—*Sciapteron tabaniformis*, Rott.—is a great rarity, and I have no first-hand knowledge of it. From the fact, however, that it feeds on Poplar, has been found at Portsmouth, and was beaten out of a Black Poplar recently in Co. Durham, I wonder if it is really so rare as we believe? The larvae, feeding in Poplar, are difficult to obtain, but as *Aegeria andrenaeiformis*, Lasp., until its life-history was discovered, was held to be one of our rarest species, may not the same apply in this case?

Aegeria scoliaeformis, Bork. I had hoped to obtain first-hand knowledge of this species at Aviemore this year, but I was not successful. The larva feeds in the thick bark of large Birch trees, tunnelling

more or less vertically. When a working is found, it should be possible with a saw and chisel to remove the working more or less complete. The usual method of collecting is to obtain imagines, drying their wings in the morning sunshine—rather a chancy business.

The next two species to be dealt with are somewhat similar in their mode of life.

Aegeria sphecoformis, Schiff., feeds on Alder and is 2 years in growth. The larvae may feed in quite large trees, in the shoots from Alder stumps which have been cut down, and in little stumpy bushes growing in marshes.

If the latter can be found, the presence of the larva is clearly indicated by the sawdust-like frass to be found very low down near the base of the stem of the bush—there can be no doubt if it is a first or second year larva by the size of the frass, but a close search is necessary, clearing away the grass, etc., from the stems. When found, saw off at ground level and keep the stump in damp sand. Larvae in shoots from stumps are much harder to find—they leave no trace outside and the only technique I know is to bend down each shoot in turn. If one contains a larva it may break off. Books say that you should look for the exit hole—a slow and rather hopeless task. The best times to get the larvae are at the end of March and early in April when they are feeding. The males assemble well to a calling female.

Aegeria andrenaeformis, Lasp. Until the life-history was made known in 1906 this was esteemed a great rarity. Now, however, it can be obtained readily in the stems of *Viburnum lantana*, the Wayfaring Tree. Search from November onwards till March, or until the leaves come out. The mines may be low down in the main stem, higher up or in quite small branches. Capped mines are the hardest to find, but many of those uncapped contain larvae. If the hole is black in the latter case, it is an old one, but if brown or reddish it probably contains a larva. Cut off 4 ins. below the hole, and 8 ins. above and place in damp sand. If tenanted the larva will block the uncapped entrance with frass in about a fortnight after being warmed up indoors. This is an easy species to breed but very subject to Ichneumons. The imago is seldom seen.

Aegeria tipuliformis, Clerck. This is perhaps the commonest of any *Sesia* and occurs in most town gardens amongst Currant bushes. The best way to get the larvae is to search for their frass in April when they are feeding, to avoid needless damage to the bushes. The larvae are usually near those parts pruned the year before.

Aegeria vespiformis, Linn. The larva lives between the bark and the trunk of Oak stumps. Females lay their eggs in trees cut last Winter; larvae will feed in the Autumn, pupate next April. Also feeds in Hawthorn, Elm, Birch and Poplar. Frass may be found in affected trees in the Autumn, but does not show much in the Spring, although traces may be seen. To obtain larvae prise off the bark with a chisel and hammer, and the larvae or cocoons will be exposed. The larvae are

easy to rear, feed up, pupate and emerge in glass-topped tin boxes. April is a good month to collect the larvae. The dark brown cocoon is found very close to the top of the stump.

Since writing the above I have seen the females commonly flying around Oak stumps in the afternoon sun. The moth looks just like a wasp; hovers near and suddenly settles low down on the shady side of the stump, evidently preparatory to egg laying.

Aegeria myopaeformis, Borkh. It savours of impertinence for me to talk of this *Sesia* to a London Society, for the larva is much of a Cockney. Besides Apple and Pear, this larva lives under the living bark on Hawthorn and has been taken in Regent's Park. It is not an easy larva to rear as one does not like to cut down one's own trees, and it is not always possible to persuade one's friends that drastic measures are necessary to save their trees. Frass indicates affected trunks or branches which may be sawn off, or possibly sleeved.

Aegeria culiciformis, Linn. This is one of the commonest of the Southern Clear wings, but one of the hardest to rear if taken too early as a larva. Tutt says that the quantities of frass thrown out indicate the presence of larva, but I regard this as most misleading. The only indication of larvae being present are round holes between the bark and the wood of the Birch stumps, or capped holes like beetle borings in the solid wood. I discovered this one day in April when I was searching a wood. No frass and no larvae did I see, but looking at a stump on which my wife was sitting I found a pupa case protruding from the solid wood which put me wise. To take the larvae or pupae it is best, if possible, to saw off the whole stump. If not, saw through the bark and a little into the wood, four inches down, then with the chisel and hammer cut down into the solid wood and so cut out a wedge-shaped block containing the pupa. From the fact that these larvae are full-fed in the Autumn and do not pupate till the Spring, they are the most easily damaged, and the hardest to rear if taken too early, being very liable to mould. Colonel Nurse, writing in the *Entomologist* many years ago, made special mention of this difficulty.

Like *vespiformis*, *culiciformis*, L., is a one-year larva living in Birch stumps a year old. That is to say, the moths this year lay their eggs in the stumps of Birches cut down last winter. It is reported that *culiciformis* also mines growing Birch shoots, in this case pupating above the exit hole, as does *andrenaeformis*. I have never found such larvae. I have never seen *culiciformis* on the wing, but it has been reported that it is to be seen similarly to *vespiformis* already referred to. In the case of *culiciformis*, however, the female must seek out the new stumps of trees recently felled, so that in searching for it the breeding ground must be left and a move made to the ground recently cleared of timber.

Aegeria formicaeformis, Esp. I have no first-hand knowledge of this species, which is often taken in the perfect state flying around Osier beds. The larva is said to feed in old Osier stumps under the bark, and also in the shoots. Last year I sent some mines, which I had found in

young two-year-old shoots of Sallow, to Mr Fassnidge, who replied that they might be either this species or an unusual form of the mine of *flaviventris*. They turned out to be the latter species, but this shows the type of mine which they do form at times.

We now come to 3 *Sesia* which are root-feeders, but which may perhaps be obtained more easily in the perfect state.

Dipsosphesia scopigera, Scop., or *ichneumoniformis*, Schiff., as we used to know it, feeds on *Lotus corniculatus*, but the imago is usually to be found by sweeping grass in its haunts on downs, cliffs and chalk pits.

Aegeria muscaeformis, Esp., lives in the Sea Thrift, but the moth can be seen hovering over Thyme on sunny days in its rocky haunts. The larva is to be found in poor small plants growing very near the sea; affected plants showing a red patch of frass.

Aegeria chrysidiformis, Esp., I have never taken in the larval stage, but it is to be obtained by digging up Dock or Sorrel roots, the mines being easily seen when present. Poor stunted plants are the most likely. Always re-plant untenanted roots—they will be likely to be selected by the females for next year's brood. The larvae are said to be easily reared by planting the affected roots in their own soil and keeping them watered. The moth itself is to be seen fairly frequently in its chosen quarters in the Warren at Folkestone, but falls of cliff frequently cause damage to its feeding grounds.

Lastly, we come to the latest addition to the British List, *Aegeria flaviventris*, Stdgr., discovered by our member Mr W. Fassnidge. The gall in the twigs of Sallow is well known to members of this Society, who obtain it in the even years at their field meetings in April. The larva favours old sallows, but is also to be obtained in shoots from stumps recently cut down. The gall is somewhat like that formed by the beetle *Saperda populnea*, Linn., but the latter can always be distinguished by its horse-shoe mark, whilst *flaviventris* make a slight cutting almost all around the stem. Tenanted galls can be determined by the frass ejected, as the larvae wake up on being brought indoors. They should be obtained as early as possible for Tits are very liable to peck out the galls. When obtained, the shoots should be kept in damp sand.

This brings us to the end of the British species, but I feel I must add a word of warning. Because we see a lovely *Sesia* under the glass in its cage, we have not got it safe until it is in the bottle. Actually, the smaller species nearly all jump backwards when alarmed—thus, to box a specimen put your box behind him and he will jump backwards into it with quite a "plop"!

I am afraid now that I have already taken up too much of your time, but I can only plead my interest in this charming family, and add how grateful I shall be for advice concerning methods of searching, breeding and localities from those who have their "pets" amongst the species dealt with. To those who have far more knowledge than I possess, I would say that they would have been spared the infliction of this paper had they only diffused their knowledge far more widely!

THE CYNIPID GENUS RHODITES. (HYMEN.)

By M. NIBLETT.

Read 8th July 1943.

There is some question as to the name *Rhodites* being the correct one for the genus under discussion. Linnaeus in 1758 described an insect which he called *Cynips rosae*; Fourcroy in 1785 described what was apparently the same insect under the name of *Diplolepis rosae*. T. Hartig in 1840 gave *Rhodites* as the generic name, which has been used for the genus up to recent times. In 1917 Rohwer and Fagan apparently decided that *Diplolepis* was the correct name; their decision was accepted by some American students of this group, but as in the bulk of the literature in the Eastern Hemisphere the name *Rhodites* is in general use, I propose to retain it in this paper.

The insects are to be found in both hemispheres and the described European species comprise, *R. rosae*, Lin., *R. eglanteriae*, Htg., *R. rosarum*, Gir., *R. spinosissimae*, Gir., *R. centifoliae*, Htg., *R. mayri*, Schlet., *R. nervosus*, Curt., and *R. kiefferi*, Lois. These insects are responsible for galls, which occur chiefly on the leaves, but may at times be found upon other parts of the plant. A great many species and varieties of the genus *Rosa* have been recorded as their host-plants, but I know of no instance where a cultivated variety has been affected; several attempts I have made to induce ovipositing on garden roses have proved abortive. The percentage of males to females is as a rule very low, so parthenogenetic reproduction must feature largely in the biology of these insects. I have bred quite a number of the insects, but have not yet found a male. Certain cases have occurred where the supposed male *Rhodites* has turned out to be the male of an inquiline affecting the gall. Frequently, from a considerable number of the galls no gall-wasps will emerge; this is often due to the larvae being starved owing to the presence in the galls of the larvae of the aforesaid inquilines, or through them being devoured by the parasitic larvae of Chalcids, or Ichneumons. Also there is a considerable mortality among the gall-wasps themselves in the galls; they reach maturity, but for some reason fail to emerge. I recently bred 2200 insects from 3300 rose galls, of which only 121 were gall-wasps, the remainder being either inquilines or parasites. The galls may be found from early July to October, although those of *R. rosae* and *R. mayri* may sometimes be found after all the insects have emerged, still attached to the branches in the summer of the following year. In their earlier stages their consistency is rather soft and sappy, but as time goes on they become harder, finally having quite a woody texture. The colour is at first green, but exposure to sunlight causes chemical changes in the outer zone which takes on a reddish tinge; this often disappears, the gall finally becoming more or less brown in colour. Galls in positions where little or no sunlight

reaches are usually pale in colour, being whitish or yellowish green. Galls containing inquiline larvae are frequently enlarged and distorted. This is not easily discernable where the galls are normally irregular in shape, but in those which have a fairly regular outline such as the "pea galls," it is very noticeable. If the inquiline larvae are attacked at an early stage by parasites this enlargement does not take place. The galls of *R. rosae*, *R. mayri*, and *R. spinosissimae* are plurilocular, while those of the other species are unilocular. The latter, however, when infested by inquiline larvae become plurilocular; instead of having a rather large larval chamber surrounded by a thin outer wall, they consist of a series of cells separated from each other by cellular tissue each containing a larva. The galls vary very much in size. In the plurilocular type size depends largely on the number of gall-wasp larvae inhabiting them, but in the normally unilocular the number of inquiline larvae is usually the determining factor. The latter are not infrequently from 7 to 10 mm. in diameter when so infected, whereas what we may call normal galls are from 4 to 5 mm.

The majority of the insects emerge in the 2nd year, but a few Chalcids may emerge in August and September of the 1st. These are generally females and presumably hibernate, attacking the larvae in the fresh galls in the following year. One thing came to my notice: when examining pea-galls after the emergences had finished, I had a number of galls 7 to 8 mm. in diameter, and these when opened disclosed that they had only a single larva, presumably that of the gall-wasp, which had perished at a very early stage. As the activities of the larvae are responsible for the growth of the gall, what could have caused these galls to reach the proportions they did with no living larvae in them to supply the necessary stimulus? Many galls examined dead had fully matured gall-wasps in them; it has been suggested that if the galls are gathered too early there is likely to be a heavy mortality among the gall-wasps. There may be something in this. I have had a higher percentage of emergences of the gall-wasp from late collected galls, although some collected early have at times given a substantial yield. Late collecting presents difficulties, however, as it is not always possible to get to localities we should like to at specified times, and we are loath to pass over specimens when they are available; also where the galls are of a type which drop when approaching maturity we may lose them altogether if the gathering of them is left too late.

Having dealt with this group in general terms, we will now consider the individual species.

Rhodites rosae, L.—The gall of this species is the well-known "Bedeguar," or "Robin's Pin-cushion." It has been recorded from many species and varieties of roses: I have it recorded on *Rosa canina*, L., from 50 localities in Surrey, also from Sussex, Middlesex, Kent, Hampshire, Isle of Wight, Yorkshire and Wiltshire; additional hosts have been *R. rubiginosa*, *R. micrantha*, and *R. arvensis*, in various Surrey stations. During the past few years I have searched *arvensis* rather closely for

this gall, but have observed very few, although adjoining plants of *canina* were often quite heavily galled. The usual position where these galls occur on the plant is the leaf, but they may be found enveloping the fruit if occurring on the sepals. Many have the appearance of springing from the bark of a branch which they frequently envelop, but if close examination is made it usually will be found that it is a leaf, which forms the foundation. Several I have found at ground level on young plants were apparently growing directly from the stem, but here again I feel certain they originated from a leaf.

I have had as a rule a fair number of gall-wasps emerge from galls kept, these coming out in May and June, and there was also one emergence in July. The inquiline *Periclistus brandti*, Ratz., the Ichneumon *Orthopelma luteolator*, Gr., and several species of Chalcids have also emerged in some numbers. The galls vary considerably in size, ranging from 10 mm. to 60 mm. across.

R. mayri, Schl. The gall of this species is, as far as records of it show, very rarely met with. Prof. J. W. Heslop Harrison recorded it from Durham in 1916 on *R. mollissima*, v. *cuspidatoides*, Crep.; it was next found at Shoreham, Kent, in 1928, on *R. canina*, and again in the two following years on *canina*, *rubiginosa*, and *micrantha*; in 1932 it was found at Eynsford, Kent, on the two last named species. I have no further records until 1942 when my son brought me a few galls, which he had found on a *Rosa* sp. near Wrotham, Kent.

The few gall-wasps I bred all emerged in June excepting one specimen, which emerged early in August, an exceptionally late date for a *Rhodites*. The gall is usually plurilocular and is covered with many fine spines which disappear when the gall is old and weather-worn. The same species of Chalcids that attack *R. rosae*, and the inquiline *Periclistus brandti*, may be bred from the galls of *R. mayri*.

R. spinosissima, Gir. In this country the gall of this species is confined chiefly to the "Burnet Rose" (*Rosa spinosissima*), and occurs in the coastal districts this Rose favours; it has been found at Barnes Common, Surrey, for many years, and although the *spinosissima* bushes there have suffered from the trampling of many feet, from fire, and more recently by the introduction of allotments, I was agreeably surprised to find in the summer of 1942 that they still survived and supported the gall. This was the only locality near London where the gall was known to occur, but in 1941 my friend, Mr J. Ross, found a few galls in Epping Forest, Essex, on *Rosa canina* and *R. rubiginosa*, from which he succeeded in breeding the gall-wasp in May. I have had it emerge in June.

The gall occurs upon the leaves and petioles. It is often plurilocular and very irregular in shape, the size depending upon the number of larvae contained in it. Chalcids take a heavy toll of the larvae and many inquiline larvae frequently inhabit the galls. *Periclistus caninae*, Htg., has generally been considered to be the species, but the inquilines I have bred were submitted to Mr R. B. Benson, M.A., F.R.E.S., who

informed me that they were an unrecorded British species, *Periclistus spinosissimae*, described in Holland by Dettmer.

R. eglanteriae, Htg. This apparently is a very rare species in this country. There are a few specimens in the British Museum and Mr J. Ross bred a small series in May and June 1942 from galls collected by him from *Rosa canina* and *R. rubiginosa* in Epping Forest in 1941. I have up to the present bred none from the thousands of galls presumed to be those of this species that I have collected.

The gall is round, smooth, and normally 4-5 mm. in diameter. It is not unlike a pea in shape, hence the name "Smooth Pea-gall." This pea-gall has been recorded as occurring on many species of roses, but recent investigations leave considerable doubt as to whether they were the galls of this species at all. The larvae are attacked by Chalcids and Ichneumons, while numbers of inquiline larvae often inhabit the galls.

R. rosarum, Gir. This insect is the cause of another pea-gall, but instead of the surface being smooth all over as in the last species, it is adorned with a number of spiny projections, which have caused the name "Spiked Pea-gall" to be applied to it. These galls have been recorded from many species of roses. I have considerable doubt as to whether the insect occurs in Britain although there are many records of the spiked gall.

R. nervosus, Curt. Under the name *Cynips nervosa*, Curtis gave in 1838 a description of an insect he captured at Dover in July. Cameron considered this to be the synonym of *Rhodites rosarum*, Gir. Continental writers either ignore it or state that it was probably a specimen of *R. eglanteriae*. Curtis's material either does not now exist or, if it does, is probably at Melbourne, Australia.

R. kiefferi, Lois. In 1912 Loisele described an insect which he stated inhabited galls similar to those of *R. eglanteriae* on *Rosa centifolia*, L., but was near to *R. rosarum* in appearance. The galls from which Loisele's insects were bred were spineless pea-galls found on *Rosa arvensis* at Liseux, Northern France. This species has not yet been found in Britain.

R. centifoliae, Htg. This is another species not yet recorded for Britain. It is generally recorded on the Continent as causing smooth pea-galls on *Rosa centifolia*, L., but Ross and Hedicke give as additional host plants *R. canina* and *R. coriifolia*.

Not being satisfied with what I had read about the insects causing these pea-galls, I collected with the assistance of several friends in 1941 over 3000 smooth and spiked galls, from which I bred in 1942 121 gall-wasps. None of these proved to be *R. eglanteriae*, but an insect which did not agree entirely with the published descriptions of any of the other species held responsible for the production of the pea-galls. The most curious and interesting factor was, that the insects bred from both spiked and smooth galls were in all respects similar. I could find no material difference and have proposed for them the name *Rhodites dispar*.

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A NOTE ON THE ECONOMY OF THE ROSE BEDEGUAR GALL, RHODITES ROSAE, L.

By K. G. BLAIR, D.Sc., F.R.E.S.

Read 8th July 1943.

That a considerable number of species of inquilines and parasites may be bred from these galls is a familiar fact, but so far as I know little attempt has been made to ascertain the relative frequency of these or to determine the actual rôle played by each in the gall, and it is in the hope of enlisting help in procuring data upon these points that these preliminary and very incomplete results of my own breeding are communicated to the Society.

Cameron, 1892, *Mon. Brit. Phyt. Hym.*, Vol. iv, gives the following list, compiled from Continental authors:—INQUILINES: *Periclistus*, *Synergus*, 1 sp. each. PARASITES: Ichneumonidae: *Porizon*, *Hemiteles*, 1 sp. each; Chalcididae: *Torymus* 5 spp., *Eupelmus* 2 spp., *Oligosthenus* 1 sp., *Pteromalus* 4 spp., and *Eurytoma* 4 spp. Connold, 1909, *Plant Galls of Great Britain*, gives a very much shorter list, consisting of the same two species of inquilines and 5 parasites, the latter being the same two Ichneumons and 3 species of *Torymus*. How Connold arrives at this list I fail to understand. Cameron certainly includes several species not recorded from Britain, but Connold's list is not merely an expurgated edition of Cameron's, with these non-British species omitted, neither can it have been compiled from his own rearings, as several of the commonest are omitted, while he retains some that must be regarded as at least doubtful. I give below a list of all the species reared by me in the course of some thirty years, with such provisional evidence as I have been able to obtain in the last two years of the part played by each one in the gall.

A few words on the methods by which this evidence is obtained will make matters clearer. One obviously cannot open a gall and note its contents, shut it up again and examine it later at intervals; but one can, at least during spring and early summer, when the larvae of most of the species are full fed and lying awaiting pupation, open each cell of the gall and remove the contained larvae. These larvae may then be sorted into their different species and kept under observation, and in due time the great majority of them will pupate and produce the flies. The method of storage I adopt is to place a larva in a narrow-gauge glass tube, $\frac{1}{4}$ in. outside measurement, followed by a wad of cottonwool; then another larva and another wad, and so on until my tube is full of cells each with a single larva. The full tubes, numbered and with contents listed, are then stored in a glass jar in the bottom of which is a little water to keep the atmosphere in the jar saturated and prevent desiccation of the larvae in the tubes. It is astonishing what a high percentage of the larvae arrive at maturity; even partly grown ecto-

parasitic larvae attached to their host will complete their development without further trouble.

The gall is composed as a rule of two types of cell, that of the *Rhodites*, which is usually larger, round and but little fused with neighbouring cells, while the *Periclistus* cell is smaller and frequently fused with its neighbours into a mass of more or less irregularly shaped cells; one is thus usually able to say whether a parasitic larva is in a *Rhodites* cell or a *Periclistus* cell. I have usually worked with small numbers of the galls, most often isolating single galls for recording purposes, though sometimes keeping two or three small galls gathered at the same time together. By so doing, though no doubt one misses a good deal, one does acquire some knowledge of what species are likely to occur together in a gall. Thus until 1941 I had never reared a *Rhodites* male, when I had two from one gall from the Carlisle district; one species of Ichneumonid recorded by both Cameron and Connold I have never yet found, nor have I found any species of *Eupelmus*. Yet I have, I think, reared all the species that can be said to be commonly found in the gall and of most of them I have some evidence as to the part they play in its economy, though as yet this evidence is too scanty to be sure that their efforts are confined to the part here assigned to them.

CYNIPIDAE

Rhodites rosae, L., the gall-maker. The female is at once recognizable by the red and black abdomen, the ventral sheath of which is ploughshare-shaped and produced into a long point. The ♂ lacks the red on the abdomen but the neurulation agrees with that of the ♀ and differs from that of the next genus in having the basal abscissa of the radial nervure elbowed in the middle, forming an angle re-entrant to the radial cell. This sex is apparently rare and I have only once met with it myself. Others working with larger numbers of the galls (Callan, 1940, *Proc. R. Ent. Soc. Lond.*, A: 21-26) rear only one ♂ to about every hundred females.

Periclistus brandti, Htg. An abundant inquiline, present in nearly every gall analysed; smaller on the average than the *Rhodites*, with body uniformly deep brown, almost black, the legs and antennae paler; the basal abscissa of the radius is straight. The cells occupied by it often form a compact plurilocular mass of thick-walled cells.

Synergus ruficornis, Hart., given as an inquiline of this gall by both Cameron and Connold, was not included among the British species of Cameron's Monograph, 1892, but was first recorded as British by Morley, 1931, *Entom.*, 64, 250. My single record is from a gall from Beer, S. Devon, but its identity has only recently been recognised, by Mr Benson, and I unfortunately have not kept full details of the gall, though it produced flies of six species.

ICHNEUMONIDAE.

Orthopelma luteolator, Ratz. (*Hemiteles* of many authors). An abundant internal parasite of the *Rhodites*, occurring in nearly every

gall analysed, but itself subject both as a prepupa and pupa to parasitism by the Chalcid *Habrocytus bedeguaris*. The larva leaves the empty skin of the host in the autumn, but does not pupate till spring.

[*Porizon harpurus*, Grav., recorded by Cameron and Connold, and said by Walker, 1872, *Entom.*, 6, 43, to be one of the chief agents controlling this gall I have never found. Morley, 1904, *Brit. Ich.* 5, was also unable to obtain confirmation of the record by breeding from this host, although he says the species is not uncommon in the country. Walker, *loc. cit.*, makes no mention of *Orthopelma* and the question arises whether the *Porizon* can have been replaced by the *Orthopelma* between 1872 and 1904, or does it replace it in some districts, or was Walker merely repeating old records without checking the determination?]]

CHALCIDIDAE.

Torymus bedeguaris, L. This brilliant metallic green and golden Chalcid, of which the ♀ has an ovipositor about as long as the whole body, I have found in the majority of galls analysed, where it appears to be a parasite only of the *Rhodites*. Cameron, 1892, records five species of *Torymus* from this gall, and Connold three; also Walker, 1847, *Zool.*, 5, 1661, records rearing three species of *Callimome* (= *Torymus*) from these galls, of which this was one, but Cameron subsequently, 1901, "Revision of the British Toryminae," *Entom.*, 34, 273, gives this gall as host only for *T. bedeguaris*, which is said to occur rarely. I have hitherto failed to obtain more than one species of *Torymus* from them.

Oligosthenus stigma, F. A black Chalcid with smoky wings with a large black stigma, the ♀ with an ovipositor rather shorter than that of *T. bedeguaris*, is stated by Walker, 1872, to be, with *Porizon harpurus*, one of the chief controls of the galls in this country. It is perhaps somewhat local, as until two years ago I had never met with it, but it is common enough in galls from Oxshott and Ashted. It appears to attack mainly *Periclistus*, but some of the females are so big as to suggest that it must at least occasionally attack *Rhodites* also; furthermore I have found the larvae in what I believe to be *Rhodites* cells.

Eurytoma rosae, Nees. A black species with clear wings, the ♀ with an ovipositor scarcely exerted, and the ♂ with peculiar antennae, each joint of the flagellum being stalked and with outstanding hairs. Four species of the genus are recorded by Cameron, 1892, as having been bred from this gall and all are found in Morley's *Catalogue of the British Chalcididae*, 1910. I have hitherto been able to recognise but one species, and that but rarely found, and have not yet discovered its larvae in the galls, though on one occasion I found a fresh adult ♀ in a mass of *Periclistus* cells which subsequently produced numbers of *Oligosthenus* and *Habrocytus* besides the *Periclistus*. This gall already had a number of old exit holes when found, which caused me at first to take it for an old vacated gall. This same species of *Eurytoma* infests the pea-galls of *Rhodites eglanteriae*, Htg., in which it has a very rapid

development, attaining maturity and leaving the galls as soon as they are ripe, towards the end of August. This rapid development it achieves at the expense of the growing larvae of *Periclistus*, the *Eurytoma* larva biting its way from one *Periclistus* cell to another and devouring the occupant. That its behaviour is much the same in the gall of *Rh. rosae* is evidenced by the old holes in the gall above mentioned, by which no doubt the main hatch of the *Eurytoma* had escaped the previous autumn, a few belated individuals at most passing the winter in the gall. Further, a re-examination of this gall revealed several instances of direct passage from one *Periclistus* cell to another, passage that could have been effected by the *Eurytoma* larva only in the late summer before the gall tissues had become woody. It would appear therefore that the *Eurytoma* is a direct predator upon the *Periclistus* rather than a parasite.

Walker, 1847, records *E. plumata* (= *aterrima*, Schrank, of Morley's Catalogue), a species not cited by Cameron as having been reared from this gall.

Habrocytus bedeguaris, Thoms. Cameron, 1892, gives 4 species of *Pteromalus* as parasitic in this gall, but none of them appear in Morley's Catalogue, unless this species be synonymous with one of them. My determination is from the British Collection in the Natural History Museum (det. C. Ferrière), where it is the only *Pteromaline* bred from this host. Unlike most of the inhabitants of the gall, it does not spend the winter as a full-grown larva, but I have found even young larvae as late as June attacking the pupae of *Orthopelma*. I have also found full-grown larvae and pupae in both *Rhodites* and *Periclistus* cells without identifiable remains of the host and suspect that it may attack larvae and pupae of many of its fellow lodgers; I have even found a small larvae, presumably of this species, attacking a pupa of its own species, while pupae with remains of another of the same species in the same cell are not uncommonly found. The question thus arises of how and when its egg is introduced into the cell of the host. Presumably, unless the egg has lain dormant all winter and spring, it must be introduced by a hibernated female when the host larvae are full grown. At this time of the year the gall tissue is hard and woody, and the *Habrocytus* has no long boring ovipositor as have many of these parasites, so how she contrives to introduce her egg into the cell remains for me a mystery. The fly is blackish bronze with a purple abdomen, pointed in the ♀ but without exerted ovipositor; the short radial vein branching from beyond the middle of the costa is as long as the preceding section of the vein lying along the costa.

[*Eupelmus degeeri*, Dalm., recorded by Cameron, 1892, as reared from this gall, I have never bred. Specimens in the Natural History Museum are noted as having been reared from wheat stubble, and I have taken the apterous hopping adult among low herbage on the sandhills near the sea in North Devon, in the Isle of Wight, and at Benfleet, Essex; apparently a very unlikely species to be parasitic in this gall.]

BETHYLIDAE

Bethylus cephalotes, Foerst. A single specimen reared some years ago was probably an accidental intruder in the gall, its normal host being micro-lepidopterous larvae.

COLEOPTERA.

Balaninus villosus, F. This weevil is more usually reared from the oak apple, the gall of *Biorhiza terminalis*, but on one occasion I had five larvae emerge from a *Rhodites rosae* gall from Frome. The larva feeds on the gall tissue while still fresh, probably including the young larvae of the Hymenoptera, and emerges when full grown to pupate in the earth, so is absent from spring gatherings of the galls.

These remarks will, perhaps, be enough to show how much still remains to be done in the elucidation of the economy of this gall, which lends itself well to analysis in this manner. That it is so much more easy to deal with than other galls with numerous and varied inhabitants, such as those of the oak, *Cynips kollari* and *Biorhiza terminalis*, is due I think mainly to the fact that all the species concerned emerge at about the same time and within a relatively short period, instead of some flies emerging in the autumn of the year of origin, while others wait until the following year or even longer. In the *Rhodites* gall larvae removed from their cells in May have not an unduly long time to wait, with increased risk of desiccation or mould, before completing their metamorphoses, so that the chances of rearing them after removal are unusually good. I feel sure that detailed investigation of these galls on the lines indicated will repay the labour bestowed upon them much more generously than merely rearing the flies from large numbers of the galls, though work of this type is still required before we have an adequate knowledge of the distribution of the several species concerned.

SIR JOSEPH BANKS, Bt., K.B. (NATURALIST), 1743-1820.

(With Portrait.)

By C. MACKECHNIE JARVIS.

Read 13th November 1943.

It is impossible to review the events of the period covered by the late 18th and early 19th centuries without encountering the influence of Sir Joseph Banks, whether the approach be artistic or scientific, agricultural or political. Whilst it would be an inaccuracy to describe him as a personality well known in the modern world, it is surely a truism to declare Sir Joseph's services for the advancement of science as well as his influence in the cause of the Empire and the welfare of mankind to be worthy of the fullest recognition.

Joseph Banks was born in London on the 13th of February 1743 of wealthy parents, and was the only son of William Banks of Revesby Abbey, near Horncastle, Lincolnshire. Banks, who possessed the unusual distinction of claiming both Harrow (1752-56) and Eton (1756-60) as his old schools, entered Christ Church, Oxford, as a Gentleman Commoner in December 1760. Although not really a scholar, and very fond of an outdoor life, he was, before reaching Oxford, already interested in Botany, and must have been disappointed to find that his favourite subject was not at that time recognized at the University. True, there was a Professor of Botany, Dr Humphrey Sibthorp, but it is said that he delivered one botanical lecture only in thirty-five years! How characteristic of the maturer Banks that he should seek and obtain permission to "import," largely at his own expense, a lecturer in Botany, to be supported by himself and his fellow students. It is recorded that he rode to Cambridge, and, with the aid of Prof. Martyn, selected Israel Lyons, a clever young man skilled in Botany and Mathematics.

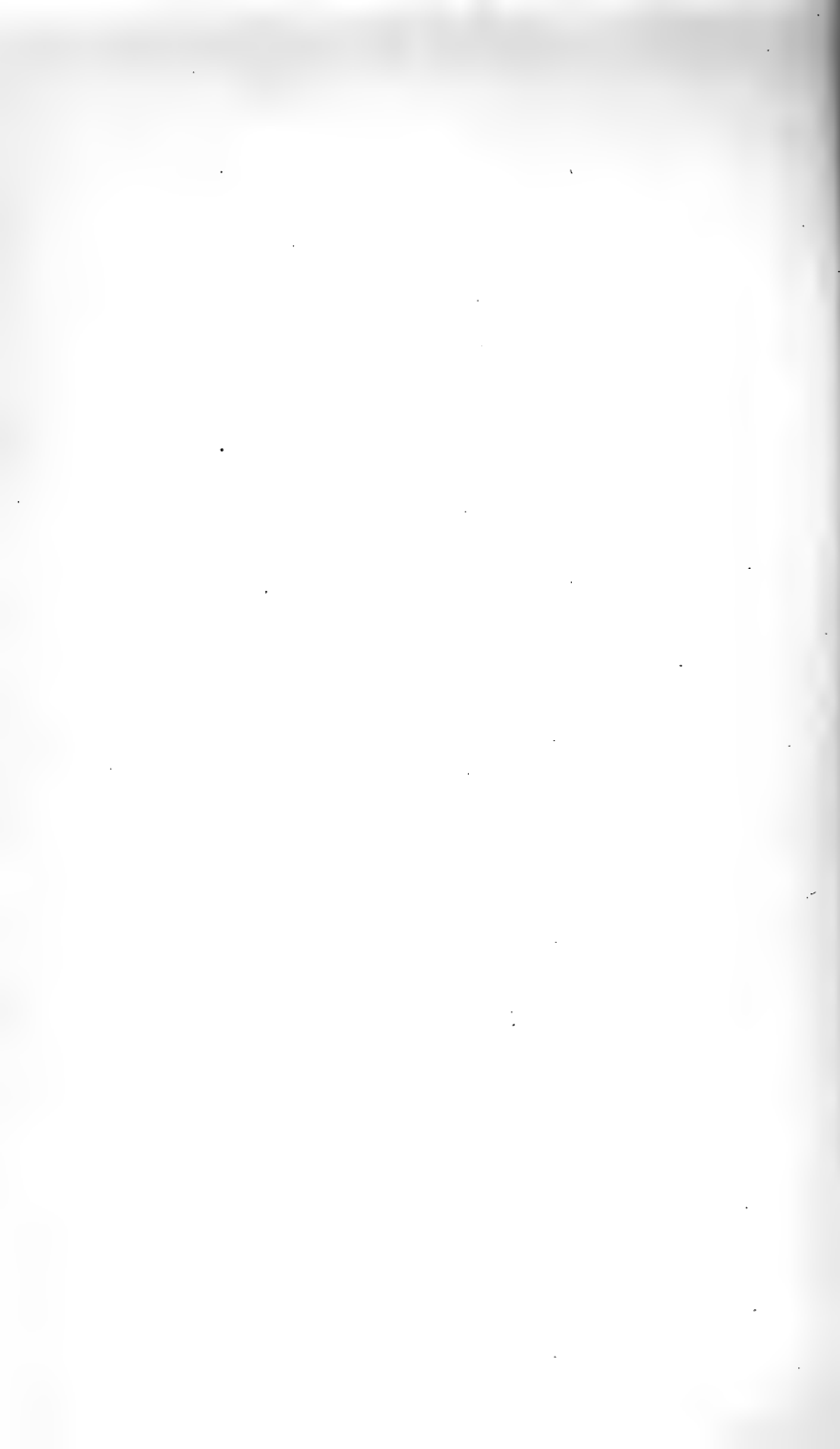
The Squire of Revesby died early in 1761 and one year after leaving Oxford, with an honorary degree, in December 1763, Joseph found himself possessed of a fine estate and a large income, variously quoted as £6000 and £30,000 per annum. Whatever the amount, it was certainly sufficient to enable him to act as a generous patron of Science, and to amass one of the largest privately-owned herbaria and scientific libraries known.

Banks' social position provided his entrée into scientific circles, and his desire to contribute something original doubtless prompted his first foreign expedition. In 1766 *H.M.S. Niger* was commissioned as a fishery protection vessel, and was commanded by his Oxford friend, Lt. Phipps (later Lord Mulgrave). Banks obtained permission to join her as a botanist, and left Plymouth on 22nd April for Newfoundland and Labrador. He returned via Lisbon in November of the same year, arriving in England in the following January, with a fine collection of



SIR JOSEPH BANKS, BART. P.R.S.

Sir. Banks



dried plants and other material from hitherto unexplored regions. The B.M. foreign herbarium contained, until recently, a large number of Banksian specimens from the Newfoundland area, including a series of the little *Linnaea borealis*, L., which, years before, had charmed Linnaeus and had been chosen by him as his special emblem. According to Weld, the first specimens of caoutchouc to reach England were obtained by Banks in Lisbon. Banks had been admitted to the Fellowship of the Royal Society in May 1766, at the early age of 23, and upon his return made his first appearance there on 15th February 1767, probably without giving a thought to the manner in which he might be destined to serve the Society in the future.

After a year spent mainly in "botanizing" and fishing in various parts of the country, an opportunity arose, which was both to make his name famous and to secure for him the life-long patronage and friendship of King George III. The Royal Society was desirous of obtaining accurate data concerning the Transit of Venus of 1769, and discussions which had proceeded since the summer of 1766 resulted in a memorial to the King, petitioning for financial and material support.

To his lasting credit King George III granted the petition of the Society, and on the 24th March 1768 the President, the Earl of Morton, was able to announce that he had received from the Treasury the required sum of £4000. For the Southern hemisphere, the observations were to be made on the island first named King George's Island, and later known by the native name of Otaheite (now Tahiti). The Admiralty placed at the disposal of the Royal Society *H.M.S. Endeavour*, a barque of 370 tons, under the command of Lt. James Cook.

Naturally, news of the expedition came to the ears of Banks, whose approach to the Council resulted in the following memorandum to the Admiralty, quoted by Weld: "The Council have appointed Mr Charles Green and Captain Cook, who is the Commander of the vessel, to be their observers; besides whom, Joseph Banks, Esq., Fellow of this Society, a gentleman of large fortune, who is well versed in natural history, being desirous of undertaking the same voyage, the Council very earnestly request their Lordships, that in regard to Mr Banks' great personal merit, and for the advancement of useful knowledge, he also, together with his suite, being seven persons more (that is eight in all), together with their baggage, be received on board of the ship in command of Captain Cook." Official consent being forthcoming, Banks proceeded to make his arrangements for the long and hazardous voyage on an ample scale, his suite including Dr Carl Solander, F.R.S., a distinguished Swedish botanist and pupil of Linnaeus, whose writings he did much to make known in this country, three artists, two English and two Negro servants. The following letter from the botanist John Ellis, F.R.S., to Professor Linnaeus at Upsala is not without interest:—

"I must now inform you that Joseph Banks, Esq., a gentleman of £6000 per annum estate, has prevailed on your pupil, Dr Solander, to accompany him in the ship that carries the English astronomers to the

new-discovered country in the South Sea, where they are to collect all the natural curiosities of the place; and, after the astronomers have finished their observations on the Transit of Venus, they are to proceed under the direction of Mr Banks, by order of the Lords of the Admiralty, on further discoveries of the great Southern Continent . . . Solander assured me this expedition would cost Mr Banks ten thousand pounds. All this is owing to you and your writings."

The *Endeavour* left Plymouth on the 26th August 1768 and, after touching Madeira, reached Rio on the 13th of November. Here, unfortunately, they experienced trouble with the Authorities, and were not allowed to land, although some of the company, including Banks, contrived to do so, the spoils including some 300 plants. They proceeded to Tierra del Fuego, where, after landing a small expedition to explore the hinterland, they were overwhelmed by the intense cold and lost the two negro servants. But for Banks, Solander would also have lost his life.

Arriving at Tahiti on 13th April 1769 they established a most friendly contact with the natives, who, it is recorded, were greatly impressed by Banks' personality. A fort and observatory were erected in preparation for the Transit, which they duly recorded on 3rd June. After leaving Tahiti, Cook sailed for New Zealand, and then, after preparing accurate charts of the main islands of the group, proceeded on his famous journey to Australia, resulting in the discovery of New South Wales and Botany Bay, so named by Cook on account of the enormous quantity of plants collected here by Banks and Solander. The story of the ship's narrow escape from loss after striking the coral reef on the East Coast of Australia and the scourge of fever and dysentery, to which Cook and Banks almost succumbed, is told in the many editions of Cook's *Voyages*, which originally appeared under the editorship of Hawksworth, who drew extensively on Banks' journal, and made the following acknowledgment:—

"In the papers, which were communicated to me by Mr Banks, I found a great variety of incidents, which had not come under the notice of Capt. Cook . . ."

Rumours of the loss of the entire expedition were current in England during the latter part of 1770 and the early months of 1771, and are quoted by various writers of the period. The arrival of the *Endeavour* on 12th July was the cause of great rejoicing and universal excitement. Banks and Solander were received by the King at Kew, and with this interview began a long and intimate friendship, valuable alike to science and to the Empire.

The adventurers returned with an enormous quantity of material, the botanical part of which was, according to Hooker, for the most part already described and needed little attention to render it ready for printing. Banks had some 700 copper plates of his *Novae* engraved, and from his correspondence it is clear that he intended publication. The mass of material and plates were stored by the Trustees of the

British Museum after Banks' death until 1900-05, when the three volumes of *Illustrations of Australian Plants* appeared as a tardy recognition of their illustrious benefactor.

The successful conclusion of the expedition strengthened Banks' relations with Lord Sandwich, First Lord of the Admiralty, who invited Banks to participate in a second voyage with Cook, then under consideration. Banks' plans for the second voyage were well advanced when official obstruction, ascribed by Sir John Barrow to the personal enmity of Sir Hugh Palliser, Controller of the Navy, finally assumed such proportions that he felt compelled to retire from the new expedition and with him went the staff of scientists and draughtsmen, engaged at his own expense for the voyage. Instead, in 1772 we find him journeying to the Western Isles of Scotland and to Iceland, thus anticipating Dr Johnson and others, who later deemed it fashionable to journey forth "in search of Scotland"! In Iceland, Banks' party ascended Mount Hecla (5096 ft.), and, according to Suttor, "were the first to complete the difficult ascent to the summit."

As was to be expected, they returned to England with numerous botanical specimens and a large number of Icelandic manuscripts, now in the British Museum. Unfortunately, Banks' journal of their journeys has not been published, although Tennant made use of his Scottish observations and detailed surveys of Staffa. Dr von Troil, afterwards Archbishop of Upsala, who accompanied Banks to Iceland, made use of Banks' notes to some extent in his account.

In 1777 Banks settled at 32 Soho Square, which remained his Town House for the remainder of his life and was the scene of many gatherings of students and men of note. In 1779 he married Dorothea, daughter of William Hugessen of Provender in Kent, and in March 1781 was honoured with a Baronetcy. Banks' house has been described as a vast museum and library in the charge of Dr Solander, who accompanied Banks on his travels and to him had proved almost indispensable.

Daniel Carl Solander was born at Pitea on the Gulf of Bothnia in N. Sweden in 1733. He was a favourite pupil of Linnaeus at Upsala and came to England in July 1760 upon his recommendation. Solander was attached to the staff of the British Museum and was elected F.R.S. in 1764. He met Banks in 1767 perhaps at the Royal Society upon the occasion of the latter's first appearance there. Solander appears to have retained his Museum appointment after his return from the Pacific, and Maiden states that he was Keeper of the Printed Books in 1773. He lived with Banks at Soho Square as "Librarian" until his early death in 1782, and of him it has been said that few foreigners were more acceptable.

The shock caused to Banks' circle by the sudden death of Solander must have been considerable, and has been cited as the cause of Sir Joseph's failure to publish his projected work on the Flora of Australasia. Solander was succeeded by another Swedish savant, Dr Jonas Dryander,

a more active man than his genial predecessor, and a compiler of the monumental catalogue of Banks' library.

Among the regular visitors to Soho Square were the distinguished naturalists J. C. Fabricius (1745-1807) and C. P. Thunberg (1743-1828). Both were pupils of Linnaeus and achieved eminence as entomologists. Fabricius was entrusted with the care and arrangement of Banks' insects, and the cabinets, now at South Kensington, contain types described by him. Thunberg, who contributed to Banks' herbarium plants collected at the Cape and Far East, succeeded the younger Linnaeus as Professor of Botany at Upsala in 1783.

In 1778 Sir John Pringle, M.D., President of the Royal Society, resigned the chair and Banks' name was among those considered eligible for candidature for the highest office in the Society, to which he was unanimously elected on 7th December 1778. Banks' services to the Royal Society during his unique tenure of office—he served for 42 years—cannot be over-estimated; he made no secret of the fact that of the many honours which fell to him none gave him greater pleasure than his Presidency.

Sir Joseph's association with the Royal Gardens at Kew began in 1772, when he succeeded Lord Bute (a horticulturalist of great repute) as Hon. Director, an office he retained for the remainder of his days. Banks conceived the idea of despatching collectors to remote parts of the world in search of plants new to Europe, and his name will always be associated with a celebrated incident in English Naval history—the mutiny of *H.M.S. Bounty*, arising out of his first attempt to introduce the Tahitian breadfruit tree into the West Indies.

Sir Joseph had encountered the breadfruit during his visit to Tahiti with Cook early in 1769. In his own words, "Breadfruit (*Artocarpus incisa*) grow on a tree that is the size of a middling oak. The leaves are approximately a foot and a half long, deeply sinuate like those of a fig tree, which they resemble in consistence and colour, and in the exuding of a milky-white juice when broken. The fruit is about the size of a child's head, with reticulated surface not unlike a truffle, and a very small core. The edible portion lies between the skin and the core, is white as snow and has a consistency somewhat like that of new bread. This is divided into three or four parts and then roasted. The taste is insipid with slight sweetness, resembling the crumb of white bread mixed with Jerusalem Artichoke." The native name for the raw fruit is "Ooroo" and when prepared for storage in the form of a sort of paste, "Mahie."

Breadfruit formed the basic food of the Tahitians, who also employed the inner bark of the tree to weave into cloth. Banks was alive to the economic importance of the plant, and was soon an ardent supporter of a plan to introduce the breadfruit into the West Indies, together with other important plants not represented in the Colony. An early attempt was made with seeds collected in Tahiti and shipped in

sealed bottles. The seeds failed to germinate and Banks concluded that access to fresh air might have saved them.

By 1787 the authorities in Jamaica had become insistent that the proposals of leading contemporary botanists should be given effect. In point of fact, the British Expedition, although planned in 1787, did not sail before November of that year, and the British experiment was, therefore, forestalled by the French attempt, in the course of which a cargo of breadfruit, cinnamon, etc., was landed at Martinique in 1788.

It was finally decided to commission the *Bounty* for the purpose, and on Banks' recommendation the command was given to Lt. Bligh, who had sailed with Cook as Master on *H.M.S. Resolution*. At the instance of Lord Sydney of the Admiralty, Banks drew up the following instructions for the use of the gardener, Nelson:—

“As the sole object of the Government in chartering this vessel in our service, at a very considerable expense, is to furnish the West Indian Islands with the bread-fruit and other valuable productions of the East, the Master and crew of her must not think it a grievance to give up the best part of her accommodations for that purpose. The difficulty of carrying plants by sea is very great; a small sprinkling of salt water, or the salt dew which fills the air even in a moderate gale, will inevitably destroy them if not immediately washed off with fresh water. It is necessary therefore that the cabin be appropriated to the sole purpose of making a kind of greenhouse, and the key of it given to the custody of the gardener; and that in case of cold weather when going around the Cape a stove be provided, by which it may be kept in a temperature, equal to that of the intertropical countries.”

“The fittest vessels for containing the plants that can easily be obtained I conceive to be casks, sawed down to a proper height, and properly pierced in their bottoms to let the water have a proper passage; in both which articles the gardener's directions must be followed. Of such half-tubs properly secured to the floor as near to each other as they can stand, a considerable number may find room in the cabin, each of which will hold several plants; and these I consider as a stock, which cannot be damaged or destroyed, but by some extraordinary misfortune. As these tubs, which will be very heavy, must be frequently brought on deck for the benefit of the sun, the crew must assist in moving them, as indeed they must assist the gardener on all occasions, in which he stands in need of their help. Beside these, must be provided tubs so deep that the tops of the plants will not reach to their edges, these must be lashed all around the Quarter Deck, along the Boom, and in every place where room can possibly be found for them, and for each a cover of canvas must be made to fit it; which covers it will be the duty of the gardener to put on and take off as he judges fitting; and no one else must interfere with him in so doing on any account whatever.”

“As the plants will frequently want to be washed from the salt dampness, which the sea air will deposit upon them, beside allowance of water a considerable provision must be made for that purpose; but,

as the vessel will have no cargo whatever but the plants on board, there will be abundant room for water casks, of which she must be supplied with as large a quantity as possible, that the gardener may never be refused the quantity of water he may have occasion to demand."

"No Dogs, Cats, Monkeys, Parrots, Goats or indeed any animals whatever must be allowed on board, except Hogs and Fowls for the Company's use, and they must be carefully confined to their coops. Every precaution must be taken to prevent or destroy the Rats, as often as convenient. A boat with green boughs should be laid alongside with a gangway of green boughs laid from the hold to her, and a drum kept going below in the vessel for one or more nights; and as poison will constantly be used to destroy them and cockroaches, the crew must not complain if some of them, who may die in the ceiling, make an unpleasant smell(!)"

"As it is likely that the easterly winds will prevail to the south of the Line from the month of March to that of September, it is hoped that the vessel will be fitted out with as much despatch as is convenient, with a view of her not losing a year, which will be the case if she misses the first monsoon. Her first destination will be New Zealand, where she is to take on board two tubs of flax plants. From thence she is to proceed to the Society Isles, where she must stay till the gardener has produced a full stock of breadfruit trees, and if Otaheite, which will probably be visited first, should not supply a sufficient number of such as are of proper age for transplanting, she must proceed to Imao, Maitea, Huaheine, Ulietea, and Bolabola, and stay till enough are procured. She is next to proceed toward the Endeavour Straits, which separate New Holland from New Guinea; and if she wants water in her passage she may put into the Friendly Isles in making the Straits, which lie in Lat. 10° 40'. The Master must not be surprised if he falls in with a reef. He may be assured that with a little attention he may explore a passage through it. In these Straits he must find some harbour in which he may fill water, which there cannot be any difficulty in performing. From thence to Prince's Island in the Straits of Sunda will be the best run; and if water should be wanted in the passage, it may be procured at Java, where the *Endeavour* watered. At Prince's Island the gardener will have some trees to get on board, which may make it necessary to spend some time there. From thence to the Isle of France will be an easy run, and from thence around the Cape, at which place the ship must not touch unless there is absolute necessity. They must proceed to St Helena, where she will receive orders from England pointing out the places in the West Indies at which she is to touch and deliver cargo."

The foregoing remarks give some idea of the thoroughness displayed by Banks in the organization of foreign expeditions. Bligh sailed in November 1787 and reached Tahiti safely. The task of collecting the plants occupied some five months, during which time the crew enjoyed an excess of liberty among the easy-going natives and were most reluc-

tant to leave. The mutiny took place a few weeks after sailing, and, as is well known, Bligh and a few survivors of the loyal members of the crew reached England after sailing across the Pacific in an open boat. The initial failure was very disappointing to Banks, whose faith in Bligh was such that he was entrusted with a second expedition in 1791, which achieved its mission.

The publication of *Hortus Kewensis* was effected with considerable assistance from Sir Joseph, and Solander, Dryander and Robert Brown, his botanist-librarians, successively contributed to it.

Banks appears as a star radiating the light of 18th century science and progress. His record is one of unbounded public spirit and disinterested service in the advancement of knowledge and improvement of economic conditions. It is said that he was regarded abroad as the greatest Englishman of his day and perhaps deservedly, since he was one of the very few public figures who did succeed in envisaging the "other man's" point of view. He lived through the period of the American War of Independence, the French Revolution and the Napoleonic Wars, and yet his was a world in which science stood aloof from strife and politics. He contrived to maintain contact with scientists in France and on several occasions secured the release of enemy nationals who fell into our hands. His attitude towards captured scientific collections is well known; in every case his representations to the Crown secured the release of the property, which in the case of Jussieu and La Billiardière rivalled his own in importance.

The extent of the collections originally at Soho Square is not generally appreciated. Apart from his personal accumulations of British and foreign botanical material, Banks acquired by purchase nearly every famous herbarium offered for sale during his active years, including those of:—

Tournefort (1656-1708) and Vaillant (1669-1722).

Hermann (1640-1695), containing material used by Linnaeus for his *Flora Zeylanica*.

Clifford (1685-1760), containing types and material of Linnaeus' most famous work, *Hortus Cliffortianus*.

Clayton (1686-1773), containing material of Gronovius' *Flora Virginica*.

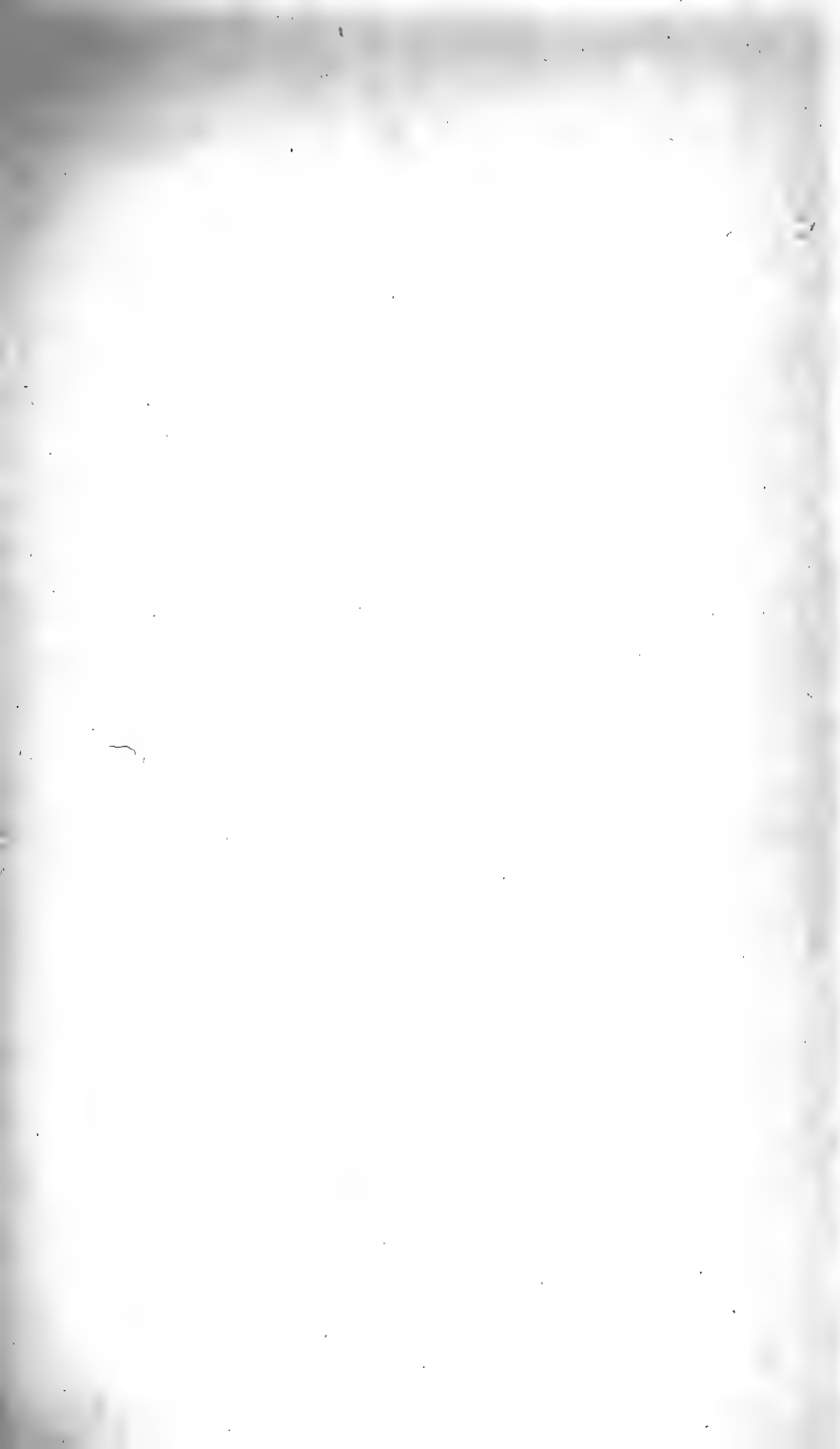
Upon the death of Linnaeus in 1778 Sir Joseph undertook to purchase the library and collections from the family, but, as it was decided to retain these for the use of the son, the offer was refused. The younger Linnaeus died in 1783 and, remembering the earlier offer from England, the executors gave Banks the option of purchase. It so happened that the letter arrived at a time when James E. Smith, a young medical student, very interested in natural history, was breakfasting at Soho Square. Banks passed the letter to him with the recommendation that he should purchase, and with his father's assistance he did so. His subsequent founding of the Linnean Society of London in March 1788, of which Banks was elected an honorary member, is too well known to require more than passing reference.

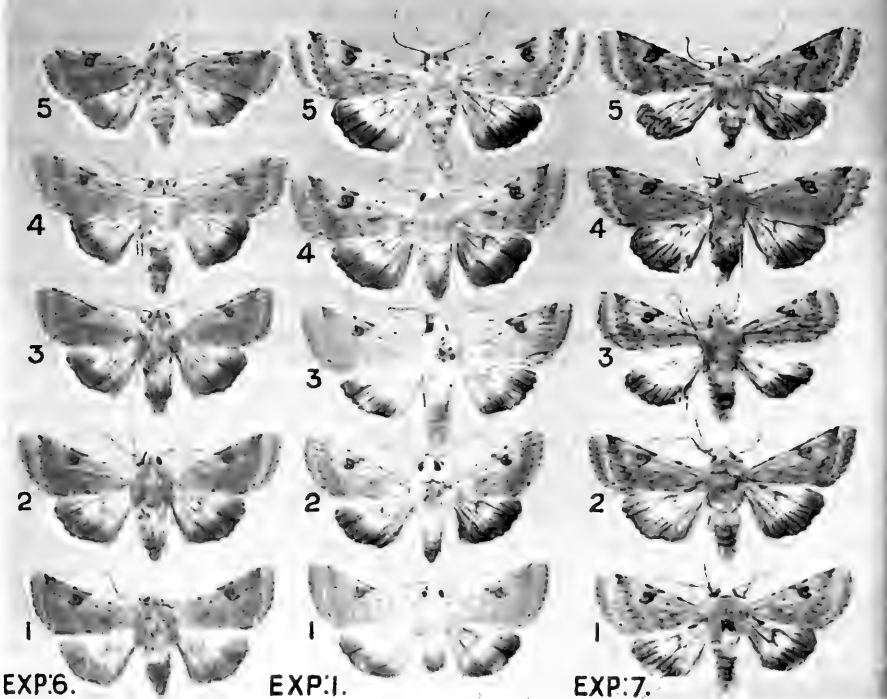
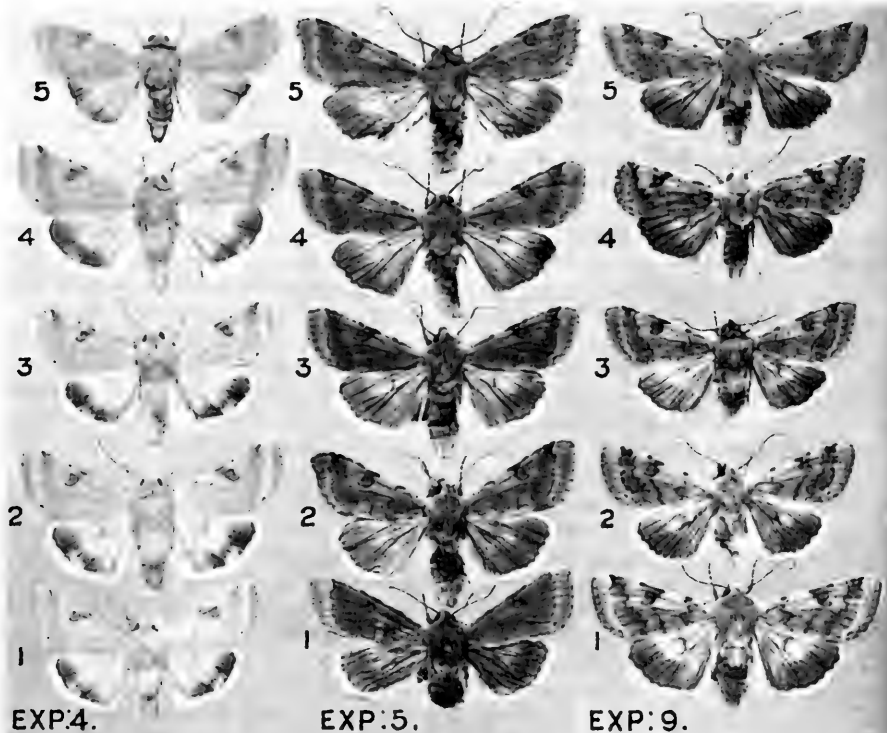
To follow Sir Joseph Banks through his busy years of office is outside the scope of the present paper. He served on Royal Commissions and many committees and took part in organizing foreign exploration on a considerable scale. A member of many societies, including those of Antiquaries, Arts, and the Dilettanti, he contrived to attend the meetings regularly, in spite of his being confined to a chair during the last fifteen years of his life.

Sir Joseph Banks died at his Heston house, "Spring Grove," a few weeks after the Council of the Royal Society had declined to accept his resignation, a tribute which gave him intense satisfaction. The subsequent history of the collections and library is well known. Subject to the life interest of his botanist-librarian, R. Brown, they were bequeathed to the care of the British Museum, where the botanical collections formed what was known for many years as the Banksian Department. According to a contemporary inventory, the collections were contained in 67 cabinets and comprised 23,400 species, excluding the special collections. It is no secret that parts of the Herbarium sustained damage in September 1940. Members may be interested in a report of the Keeper, Dr Ramsbottom, of the germination of certain seeds, which had been in the department for many years. These were of Genus *Nelumbium* from the Sloan Collection, probably 240 years old, and *Albizzia* from the Banks Collection brought from China in 1793, seedlings from which were exhibited to the Linnean Society recently.

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ACTUAL SIZE

Temperature experiments on the pupae of *H. peltigera* (see text).

**TEMPERATURE EXPERIMENTS ON THE PUPAE OF
(1) *HELIOTHIS PELTIGERA*, SCHIFF., AND (2) *PANAXIA
DOMINULA*, LINN.**

**WITH THE MANIFESTATION OF THE MENDELIAN LAW
AT A GIVEN TEMPERATURE ONLY.**

(With 2 Coloured Plates.)

By H. B. D. KETTLEWELL, M.A., M.B., F.R.E.S.

Read 11th December 1943.

I wish, first of all, to make perfectly clear the significance and definition of the meaning of these Temperature experiments. For the most part Temperature experiments can be divided into two types—the one is confined to experiments in which very high or very low temperatures are used and are of the nature of “shock” treatment. The other, which is the type to which I intend to refer in this paper, limits itself entirely to the use of normal temperatures properly controlled, as found within the normal limits of the range of outdoor temperatures in this country.

“Shock” temperatures tend to alter the normal pattern of the wings probably due to gross disturbance of the normal mechanism of pattern production, and they involve an extremely high mortality rate, in the region of 90%, and similar results can be obtained by other shock treatment such as electric shocks, X-ray application or mechanical shock due to dropping the pupa at the appropriate time. There is absolutely no evidence that any inherited factor plays a part in this.

On the other hand, the reactions of pupae to a constant, uniform, but normal temperature, whilst producing no shock, nevertheless subjects them to a condition of which the organism has no experience so that the genes which normally come into play in rotation in laying down the normal pattern in a normal and variable environment, are disturbed in relation to one another, with the result that areas of wing, which are normally flooded with pigment at a given period under natural varying conditions, find themselves at a different stage of development and unable to receive their normal pigment.

It is this variation in co-ordination between pigment deposit and stage of development of the scales of the wings which result in such phenomena as seasonal differences, summer and autumn forms, etc., and is merely the manifestation of the result of varying conditions on a sensitive gene-complex.

**(1) TEMPERATURE EXPERIMENTS ON THE PUPAE OF
HELIOTHIS PELTIGERA, SCHIFF.**

For the purpose of clearness this paper will be divided into two separate portions:—

- A. Ultimate effects on pigmentation of imagines of *H. peltigera*.
- B. Pupal reactions.

These are a natural sequence to the result of experimenting with heat and cold on the pupae.

A. PIGMENTATION EFFECTS.

Since 1928, when larvae of this species were found commonly for the first time on the south-east coast of England feeding on *Senecio viscosus* and *Convolvulus soldanella*, large numbers have been bred to the perfect state by many collectors, and under various conditions. Most of them have found a remarkable degree of variation in colour, which prompted a spate of papers on the subject in the following years.

In 1930 Dr E. A. Cockayne (1) wrote a full account of his results, and in conclusion stated "I have therefore very little doubt that light ground colour and reduced markings were the direct result of heat applied to the pupae, and since the two very dark ones developed during the coldest period in 1929 I have little doubt their dark colour was the result of cold applied to the pupae."

In 1931 I recorded (2) my own results and observations, which appeared to conflict with Dr Cockayne's conclusions. I attempted to tabulate the various factors which could possibly be responsible for the production of light or dark forms of *peltigera*. These included temperature, duration of pupal period, humidity, etc. I stated that I had bred uniformly darkish examples from a batch of pupae which I had forced, the pupae having first been kept in varying temperatures, and subsequently in heat, the whole period taking about 43 days in all. I therefore challenged Dr Cockayne's conclusions (previously stated) and asserted that, as the only difference in the method of forcing was one of humidity, "wet" heat was responsible for my dark ones and "dry" heat for his pale ones.

Later in 1931, A. J. Wightman (3) stated his views on his forcing of *peltigera* pupae. He allowed 10 days for the larvae to pupate, then dug them up, and after a further period of 10 days, "to allow the pupae to get hardened," he commenced forcing in dry heat by means of an oil lamp placed near them, to give a temperature of approximately 100° F. For the most part he produced medium-dark and dark examples, and he therefore pointed out that it in no way upheld the suggestions I had put forward earlier, on "wet" and "dry" heat producing dark or pale forms respectively.

In 1933 W. G. Wynn (4) experimented with dry heat on pupae which had been left to pupate for a period of a month. He obtained precisely the opposite effect to that which he had found in 1931 when he obtained pale examples. On this occasion he bred a varied assortment, but for the most part they were medium-dark.

At this point we were all so confused by the apparently conflicting results and views expressed that correspondence for the most part came to an end, leaving us very much where we started.

In 1932 I commenced a series of controlled experiments on the pupae of the species, in an attempt to take us a step further. These results were not published at the time because of the ever present and natural urge "to reach final conclusions." These experiments are, in fact, far from complete, but on reviewing my notes recently I considered them worthy of report, if only to refute my own theory, previously advanced, of "wet" and "dry" heat.

Thanks to the kindness of Dr Garrod of St Bartholemew's Hospital, I had at my disposal reliable incubators, cool storage, etc., which offered the optimum conditions for experimenting.

The hundreds of pupae sacrificed on the altar of heat and cold all came from Dungeness larvae, which, unless stated otherwise, *were always used within 24 hours of actual pupation*. It is fundamentally important to note this. To ensure this, each larva was kept separately in a chipette box so that observation of pupal time was assured. This, of course, resulted in a high mortality rate.

Throughout the experiments (unless stated otherwise) the following temperatures were used, which varied to within three or four degrees:

Heat, 30° C. (=86° F.).

Cold, 6° C. (=42.8° F.).

EXPERIMENT 1 (as figured).

One dozen pupae were placed on dry cotton wool in a glass-topped tin box and put into heat. These produced 100% pale buff imagines with no marked development of markings or submarginal band. Similarly, the hindwings were white, with the black outer band in which the white mark near the margin showed up very clearly.

EXPERIMENT 2.

A repeat of Experiment 1, but the pupae were lying on cotton wool saturated with water, which was kept sprinkled from time to time so as to be kept constantly wet. They produced 100% pale buff examples indistinguishable from those of Experiment 1.

These two experiments, therefore, exploded the theory of "wet" and "dry" heat put forward by me a year earlier.

EXPERIMENT 3.

Had as its object to find out if cold, by its direct effect, would produce dark examples. It will be noted that the temperatures used in this experiment follow very closely the normal day and night temperatures to which pupae must be subjected in a state of nature late in the season.

Thirteen pupae were given alternate periods of heat and cold, in the proportion in hours of 20 to 4 respectively. They hatched in precisely the same number of hours of heat as those of Experiments 1 and 2. They were 100% pale buff specimens indistinguishable from those in Experiments 1 and 2.

That cold, as such, does not directly affect the colour of the resulting imagines is further borne out by the next experiment.

EXPERIMENT 4 (figured).

Of 60 pupae from larvae which pupated late in the year (in October), and which were placed in the cold, the majority showed no inclination to hatch. These were kept in the cool for four months, at times the temperature being just above freezing. Twenty of these were then placed in heat (in this case approximately 100° F.). They produced imagines of extremely light colour, of both ground colour and pattern (including the reniform).

It can therefore be stated that neither humidity nor cold applied to the pupae produces any direct effect on the ultimate pigmentation of the imago. All these individuals show a uniformly pale ground colour with no accentuation of pattern. It would appear as if the actual speed of metamorphosis within the pupa prevents the maturing, or laying down, of the pigments to any great degree.

I wish here to make certain generalized statements about the pupal state. The life of every pupa can be divided into two phases: first a period of rest, when the anatomy of the pupa (with the exception of the nervous, circulatory, and respiratory systems) is in a state of disorganisation (following histolysis), and the second phase, which is constituted by the reorganisation of the imago from these broken-down larval tissues. The first phase may vary from a very short time to a length of time, measurable in years, during which the pupa is in a dormant state. The second phase is a "period of activity." I can find no record of there being any attempt to differentiate these two phases, and as it appears to me to be all-important to be able to refer to them specifically in this paper I suggest the names of "*passiphase*" and "*actiphase*" be used respectively. The passiphase, then, is a period of inactivity which may be of great length; the actiphase, on the other hand, when once commenced must inevitably continue to its final conclusion with the development of the fully-formed imago, which, in the case of *H. peltigera*, must hatch immediately. In some species this is not the case (as in *Eriogaster lanestris*, L., and *Brachionycha nubeculosa*, Esp.), and a fully-formed imago, having completed the actiphase, remains dormant for a long period of time within the pupal shell. The actiphase, then, covers a comparatively short period, is progressive, and cannot be delayed beyond a certain time or death will take place. In *peltigera*, temperature effects during the passiphase in regard to ultimate pigmentation are nil. It is therefore with the actiphase part of the pupal state that I now wish to deal. It can be shown that when this phase is prolonged to the limit compatible with the life of the insect the darkest *peltigera* are produced. The pigment has had time to mature, and has been laid down to its maximum.

EXPERIMENT 5 (figured).

Twenty fresh pupae were placed in the heat for 24 hours with the object of stimulating the commencement of the actiphase. They were then taken out and placed in the cold. A certain number continued to develop very slowly, and after four to six weeks it appeared that some of the survivors were nearly ready for hatching. However, they appeared too weak to complete this, so the remainder were put into heat and in a short time five hatched, which were by far the darkest *peltigera* I have ever seen. All are very dark. Two (Nos. 1 and 2) have both hindwings and abdomen uniform grey-black, forewings dark chocolate-brown, with darker brown markings showing indistinctly on top of this.

I now attempted to take the subject a step further by investigating in which part of the actiphase the pigment was actually laid down.

It will be appreciated that there is no outward visible sign of the change over from passiphase to actiphase. I therefore tried to find out the earliest definite sign of the commencement of the actiphase. Pupal colour, trans-illumination, etc., all failed to help, and eventually I was driven to accept the earliest definite sign as being the commencement of the darkening of the pupal eye-area.

Furthermore, at higher temperatures with fresh pupae the passiphase is practically eliminated, so that one may consider the commencement of actiphase and the introduction of the fresh pupae into heat as coinciding. By doing this it was therefore possible to get a unit of comparison for the temperature, 86° F. From the commencement of actiphase (= C) to the time of hatching (=H) it took an average of 8½ days (200 hours) of heat. All imagines (with one exception, No. 5, Exp. 1, *vide infra*) in Experiments 1, 2, and 3 hatched in this time.

There is a remarkable uniformity in this with certain gross exceptions, hereafter to be discussed (under B, Pupal Reactions). At this temperature a darkening of the eye-mark (E) appears on an average on the 5th day (117 hours). This can be shown thus:

At 86° F. CH = 8½ days (200 hours).

CE = 5 days (117 hours).

EH = 3½ days (83 hours).

My first experiments, then, were to try to find out whether the pigment was laid down before or after the appearance of the eye-mark (i.e. in CE or EH).

EXPERIMENT 6 (figured).

I attempted to prolong the EH period of the actiphase for as long as possible.

Thirty fresh pupae were put into heat and left there until the eye-mark was developed. They were then taken out and placed in cold. The earliest hatched in 13 days (No. 1), and the last in 29 days (No. 5). These insects are a graded series, the darkest being those which took the longest time to hatch, which are definitely darker than those which took the shortest time, but by no means could they be considered really dark

peltigera. The darkest are a uniform dull brown-buff, conspicuous for the fact that all the normal markings (sub-marginal band, etc.) are indistinct and lost, submerged in the slight degree of darkening of the ground colour.

It will appear then that, firstly, there is no darkening of the normal markings of the forewings during the EH period. Secondly, there is only a small degree of general darkening of the ground colour laid down during this period. Conversely, it was suggestive that the darkening of the normal pattern would be entirely laid down during the earlier CE period. To test this out I attempted to prolong the CE period to its maximum.

EXPERIMENT 7 (figured).

It will be shown later that during a succession of broods there appear to be certain pupae which have an inability to pass into the dormant state but must enter upon the actiphase regardless of a moderately low temperature.

From a number of such pupae placed in cold, 10 were picked out on the appearance of the eye-mark. They had been in the cold then from the commencement. The CE period was approximately 3 weeks.

Four of these pupae, showing *very faint* eye-marks, were put in heat, and all hatched in between five to six days (3 figured, Nos. 1, 2, 3). All the normal markings are greatly darkened and stand out on a normal pale buff ground colour. The sub-marginal band is dark and the scalloping internally stands out in striking relief against the pale ground colour.

The remainder of these pupae were kept in cold until the eye-marks were *fully developed*. When put in heat they hatched in 3 days, producing individuals with increased dark markings on a mahogany-red ground colour, quite unlike the ground colour of those individuals which were taken out of cold at the earliest sign of E (Nos. 4 and 5).

The following points can therefore be elicited:

The degree of darkening of the normal pattern is decided at an early stage, before the earliest signs of the appearance of the pupal eye-marks.

The maximum degree of ground colour pigment is laid down at approximately the same time that the eye-marks are developing, and to a lesser degree after they are fully present.

The following formulae can be postulated, using the two temperatures (42.8° and 86° F.):

			Pattern.	Ground Colour.
Exp. 1, 2, 3.	CH	8½ days.	Pale buff.	Pale.
Exp. 5.	CH	35 days.	Dark.	Very dark.
Exp. 6.	{ CE	5 days. }	Pale.	Dull brown-buff.
	{ EH	29 days. }		
Exp. 7.	{ CE	21 days. }	Dark.	Pale.
	{ EH	5 days. }		
	{ CE	30 approx }	Dark.	Mahogany-red.
	{ EH	3 days. }		

Lastly, there remain to be done a large number of experiments for those temperatures between 42.8° and 86° F.

It will be appreciated that, as always, this particular range of temperature is the most difficult to keep accurately because the normal daily temperatures vary both above and below the particular degree wanted. Both heat and refrigeration may therefore be needed to either increase or lower the temperature to the desired figure. I have myself tried out two temperatures within this range, namely, 54° F. and 70° F. In each case my technique was to introduce pupae into a large thermos container in an atmosphere where the temperature was at the desired figure. The temperature within the thermos remained remarkably constant.

EXPERIMENT 8.

Half-a-dozen pupae were introduced into a thermos at 54° F., following 5½ hours of heat (86° F.) to stimulate the commencement of actiphase. E appeared in approximately 13 days, and hatching took place in 24 days. The only non-crippled insect was a dark example of a beautiful ruddy-brown ground colour, and with normal markings not particularly well-marked. All the cripples were obviously dark individuals.

EXPERIMENT 9 (figured).

Pupae were introduced into a thermos at 70° F. E was reached in 6 days, and imagines appeared in 17-20 days. They are all insects with intermediate light ground colour, but with very well developed markings.

It would be unwise to draw conclusions from these incomplete experiments, but it does suggest that the laying down of the pigment, both of the pattern and the ground colour, may not be entirely a matter of length of time, but that the actual temperature itself may also play a part, and that the pigmentation of the pattern may be laid down at a higher temperature (=70° F.) than that of the ground colour.

In view of these findings we will now analyse the original results of my own and others investigations, results which appeared so conflicting.

There is a common error, allowing for discrepancies, running through all our original experiments. It was our failure to recognize that pupal changes had already taken place in much of the material we eventually subjected to heat, and, secondly, our inability to realize that the degree of pigmentation may be decided at a comparatively early stage of pupal life, approximately the middle third of the actiphase.

My own, Wightman's, and Wynn's pupae were 30, 10 and 20 (approximately) days old (allowing for time for the larvae to pupate) before being given heat. It must also be pointed out that the difference in temperature between air-heat and that of 3 or 4 inches underground is considerable. Pupae dug up and left for 10 days (such as Wightman's) are subjected to great fluctuations of normal day and night temperatures, and the actiphase will have been well on the way before he commenced experimenting. Similarly, Dr Cockayne's 1929 examples were merely the expression of the varying temperatures they had experienced during in-

dividual actiphase, so that those which hatched in "a heat wave" had had their colour decided days or weeks previously. If this fact is understood and guarded against, results will be found remarkably constant.

SUMMARY.

The pupal period can be divided into two parts, the passiphase and the actiphase.

Temperature effects during the passiphase have no effect on subsequent pigmentation of imagines (in *H. peltigera*).

Temperature during the actiphase is indirectly (and possibly directly) responsible for the degree of pigmentation laid down. It is the duration of the actiphase which is mainly responsible.

Pigment is laid down in two separate periods of the actiphase. The earlier one, which occurs before the appearance of the pupal eye-mark, is limited to the normal brown pattern of the wings, and the later one, which coincides with the darkening of the eye-mark and continues to some degree afterwards, is limited to the ground colour. These two periods are distinct, though there may be an overlap which takes place during the early appearance of the eye-mark. No amount of subsequent heat or cold can alter the colour when once a given period is passed.

Finally, there remains for us to review these conclusions in the light of Genetics.

In the experiments here demonstrated, it can be assumed for simplicity that the internal genetic formula of each individual is the same as regards colour and pattern. That is to say that each insect would produce the same form under identical treatment. It is the ENVIRONMENT WHICH HAS BEEN VARIED. The light forms, the dark forms, and the banded forms merely represent the minimum and maximum expressions of pigment deposit as the result of variation in the timing of the flooding of the wings with pigment and the readiness of the scales to incorporate it. They are the expressions of the same gene-complex which controls this, under a varying environment.

As there is no reason to believe that the actual pigment of the ground colour and the pigment of the markings differs chemically, it is most probably the state of readiness of the scales themselves to receive the pigment which decides the colour, the scales in the normal bands and pattern being ready to receive this pigment at an earlier period than the scales of the rest of the wing responsible for the ground colour. At higher temperatures neither is ready to receive any pigment.

B. PUPAL REACTIONS.

During the course of investigations into the effects of temperature on the imagines of *H. peltigera*, certain interesting observations were made on the reactions of the pupae.

In general the fresh pupae reacted extraordinarily uniformly to the moderate temperature used. As has already been stated, however, there appeared from time to time certain gross exceptions. It was found that

approximately 1% would fail to respond to heat at 86° F., and would show no signs of onset of the actiphase even after all the others had hatched. These individuals appeared refractory to normal heat, and in spite of it remained dormant in the passiphase. In Experiment 1 there was one such pupa. All the rest had hatched in an average of 8½ days (200 hours), yet this pupa remained inactive and showing no sign of the eye-mark at the end of 14 days at this temperature. It was therefore transferred to cold for 21 days before being returned to heat. It then reacted in precisely the same way as the others had done, hatching within 200 hours and producing a similar pale buff imago (No. 5). It would therefore appear that this pupa had an inhibitor to heat which was satisfied by a short period of cold, after which it acted normally. I suggest that the presence of this inhibitor may be due to an inherited factor.

I wish now to turn to other pupal reactions. During a rapid succession of broods in the summer months there appears to be a tendency to rapid metamorphosis, and there is some evidence that in some pupae this urge to hatch is independent of temperature effect. In Experiments 4 and 7 certain pupae, which had been placed in cold, failed to face a dormant state but passed slowly into the actiphase in spite of the moderately low temperature, and subsequently hatched. It would appear as if these pupae were unable to remain in the passiphase, and that the machinery for undertaking hibernation was absent. It is to be assumed that there must be some factor present enabling the other pupae to hibernate. This also may well be an inherited factor.

It now appears possible to designate certain formulae for various groups of pupae of this species:

“H” represents presence of Hibernating Factor.

“h” represents absence of this factor.

“T” represents Direct Temperature (Heat) Control (=Absence of Inhibitor).

“t” represents presence of Inhibiting Factor to Heat.

The majority of the pupae have the formula “TH.” They will respond to moderate heat; nevertheless, they are capable of undertaking hibernation in the absence of heat. “tH” represents those insects which are refractory to heat and are not stimulated to undertake the actiphase by it (Experiment 2). “Th” represents those pupae which are unable to go into hibernation, and must therefore develop into imagines or die.

It would appear that the valency of “H” varies markedly in the individual both as regards the duration and the degree of cold necessary to satisfy it. Earlier on it is little developed and easily satisfied. When once the hibernating stage has been undertaken and several months have passed, the pupal reactions to moderate heat are entirely different and far from uniform.

In Experiment 4 the high temperature of 100° F. was used on pupae which had been in hibernation for 5 months. It is true they all hatched, but they took much longer than summer pupae to commence the acti-

phase and in hatching. This is even better seen in more moderate temperatures as in Dr Cockayne's 1929 insects, from larvae collected in the autumn of 1928. Of 23 pupae which survived the winter 4 of the resulting imagines did not hatch until September and October (the 22nd) the following year, having "successfully resisted the extremely hot weather of 14th-21st July."

It would appear, then, that after wintering the formula of pupae is "th" for moderate temperatures, and that the date of hatching is decided by the time taken for the "H" factor to become "h", and that during this time the pupa is unaffected by moderate heat.

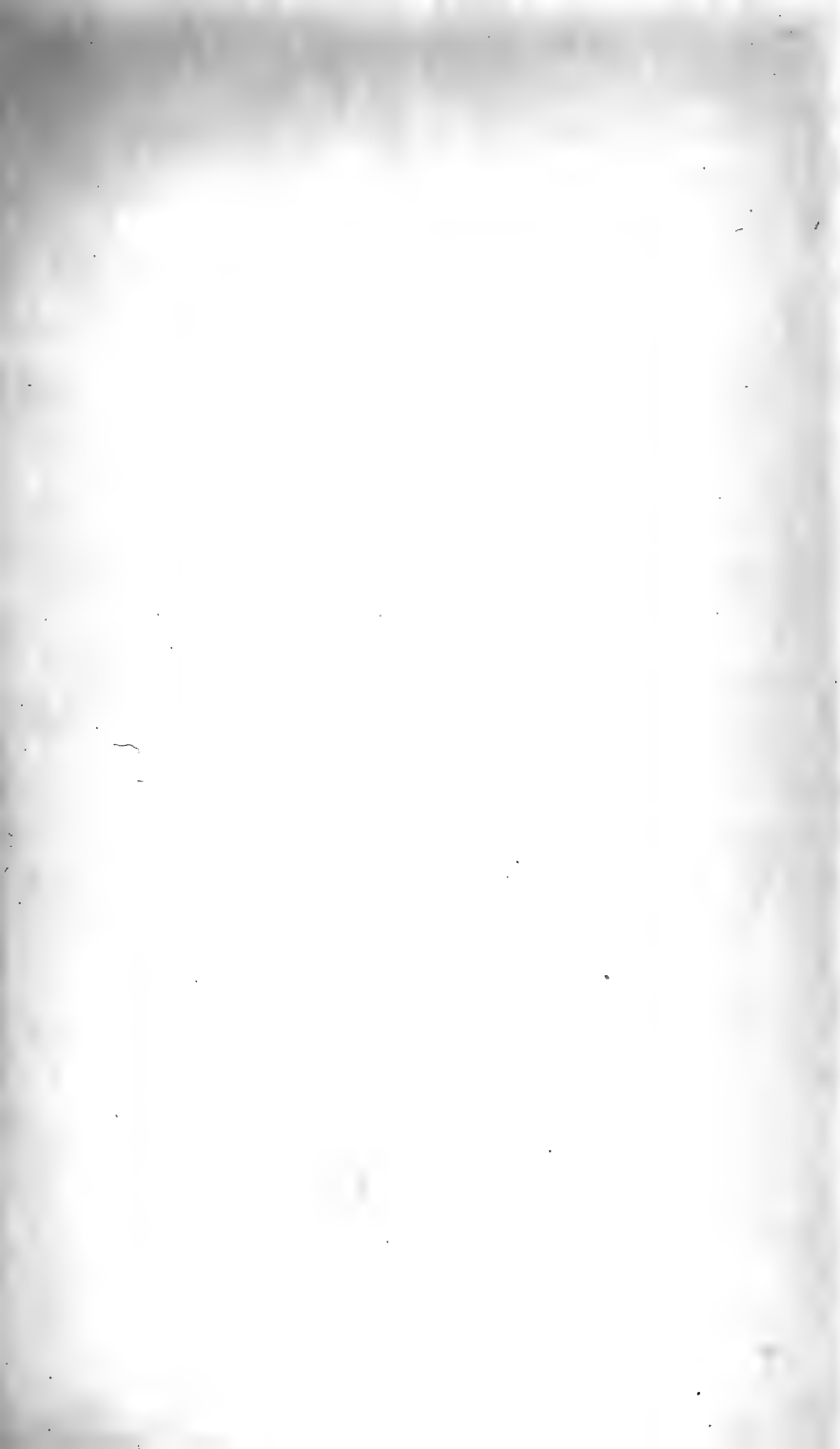
F. V. L. Jarvis has shown (5) that the effect of continued heat on pupae of *P. brassicae*, which were of a hibernating strain, was to increase the time of hibernation up to 2 years, and ultimate death. He explained this by assuming that heat stimulated the production of "H", and that those cells in the body of the pupa which produced the substance only cease to function (or atrophy) after a period of cold. It appears that a similar state may exist in some *peltigera*. This is certainly a great provision of nature to ensure the survival of certain individuals for the following year no matter what are the weather conditions.

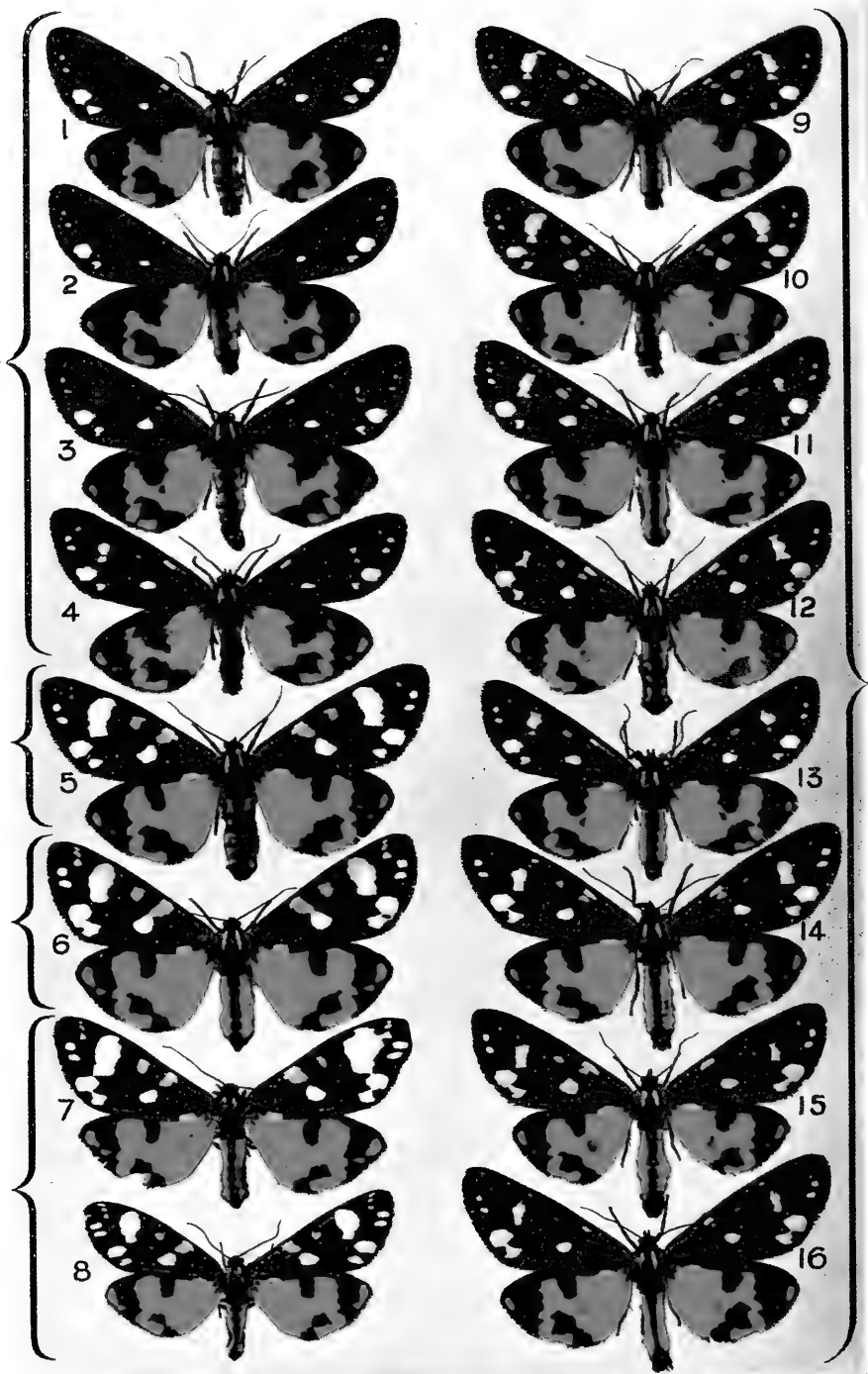
It is common knowledge that the progeny of later broods in certain seasons frequently come to nothing due to sudden changes in weather conditions.

It will be very interesting to see if this theory can be applied to those *peltigera* which come from the West of England. Here in Devon and Cornwall this insect appears to be indigenous, recurring each year regularly quite unlike its Kentish confreres. They differ also in other respects. There is no evidence of the same degree of multi-broodedness; the larvae feed practically entirely on *Ononis*; the imagines come regularly to sugar, whereas the Kentish ones do not, even though sugaring is regularly undertaken on the spot where it is known to occur in thousands. Furthermore, I believe I am able to recognize these Western *peltigera* in collections. The forewings are a golden-yellow quite unlike any bred by me from Kent; the outer margin of the forewings appears more rounded, and they probably have a different origin. There is evidence that our Kentish ones are the progeny of immigrants from Southern Germany. These Devon ones may have arisen originally from Western European *peltigera* but are now indigenous.

I should expect to find in these a much higher percentage of pupae refractory to heat ($=tH$) so that the majority are adapted for a twelve-month life history, though there is evidence that in some seasons it is at least double-brooded. This provision would obviously adapt the species much more satisfactorily for a resident, because more pupae would be encouraged to undertake hibernation quite unaffected by extrinsic temperature conditions ($=T$).

In Kent and Eastern England this would be of little help as the pupae appear to be unable to withstand the winter here anyway, so that these pupae would be merely wasted. The repopulation of this species in





ACTUAL SIZE

The effect of a constant temperature (70° F.) on the pupae of a particular strain of *P. dominula* (For explanation see text).

Eastern England is therefore from fresh immigrants from Southern Europe, where multi-broodedness is the rule, and where a high proportion of pupae with a temperature inhibiting factor (t) would be a disadvantage.

SUMMARY ON PUPAE.

The pupae of Kentish *peltigera* fall into four groups representing a combination of the presence or absence of two factors which may be inherited, and by which the duration of the pupal state is decided. The two factors are:

1. An inhibitor to heat (=t).
2. An ability to undertake hibernation (=H).

The majority of fresh Kentish pupae are capable of hibernating, yet will respond rapidly to heat (=TH).

A small minority are refractory to heat unless first satisfied by a short period of cold (=tH).

A proportion are unable to pass into hibernation and cannot survive a winter (=Th).

It appears that after a long period of cold (=hibernation) pupae react differently on subsequent application of moderate heat (=th).

It would appear that there is a balance between the degree of heat and the valency of the hibernating factor in deciding the duration of the pupal period in the pupae that have once undertaken hibernation.

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- (4) W. G. Wynn. *Ent. Rec.*, Vol. 45-46, 1933-34.
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(2) TEMPERATURE EFFECTS ON THE PUPAE OF PANAXIA DOMINULA, LINN.

In the spring of 1943 I decided to take samples of larvae from known broods of *P. dominula*, with the twofold purpose, firstly, of discovering, in advance of the main hatching, the results of the previous year's pairings, and, if possible, to force through a second generation in the year, and, secondly, of seeing if any differences were noticeable between those bred at a constant warm temperature and those (in the main brood) bred at varying out-of-door conditions.

The method employed was as follows: In early March approximately 20 larvae, which were just coming out of hibernation, were taken from each brood. These were placed in a temperature of 70° F. (varying + or - 5°). They fed up rapidly, and pupated at the end of the month and produced imagines in April. With the exception of one brood which showed certain gross changes hereafter to be described, the following minor variability was noted: There is a definite tendency at 70° F.

for all *dominula* of normal pattern to have a reduction of the size of the forewing spots, in particular the subapical blotch is narrowed and hooked internally. The apical spots are small or partly absent.

In those broods which contained the ab. *medionigra* strain the expression of this gene appeared to be much accentuated at this temperature in particular in regard to the hindwing pattern.

Of 13 insects bred at 70° F., 3 showed complete joining of the black band of the hindwing from the costal spot to the inner angle. A further 6 had the costal spot joined to the central spot of the hindwing, to make a "dagger-shaped" mark. 4 showed no marked increase of markings.

On the other hand, of a series of 61 from the same brood, but bred at varying out-of-door temperatures, none had the complete band and only 14 had the costal and central spots joined. I am unable to state any constant differences of the forewing spots due to temperature.

The results of one brood are worthy of recording in detail: The parents, both from wild *Deal* larvae in 1942, were bred out of doors and were both normal for the factor to be discussed (Nos. 7 and 8). Actually the ♂ was referable to ab. *crocea* and the ♀ was asymmetrical, with the subapical blotch, of one forewing only, merged into the apical group of spots.

23 insects were bred at 70° F. Of these, 6 were normal *dominula* (as No. 5), 5 were of an entirely new form with the forewings practically all black (glossy blue or glossy green) and with only the remains of the spot at the inner angle present, along with minute traces of the lower end of the subapical blotch. The hindwings showed a great increase of all the black markings (as Nos. 1, 2, 3, 4). The remaining 12 were intermediate between this latter form and normal *dominula*, varying from individuals with only the upper basal spot split into two to those with extensive breaking up of all normal spots present with a definite tendency for the basal spots to be represented by small horizontal streaks (as Nos. 9-16).

It therefore appeared that the brood segregated into a simple Mendelian ratio 1:2:1 at 70° F., with a variable heterozygote.

Twenty insects of the same brood were later bred in a conservatory facing West with temperatures varying from 45° F. to 80° F. All were normal *dominula* (as No. 6).

The new *homozygous* recessive form in some respects resembles ab. *paucimacula*, Schultz, but in the absence of further evidence must not be accepted as this. Furthermore, certain of the heterozygotes show a likeness to ab. *diluta*, which I described and figured in these *Transactions* for 1942, only the hindwings are not so pink.

It appears then that we have here a gene-complex which is able to express itself only in an abnormal environment, in this case the abnormality being the absence of temperatures lower than 70° F., or alternatively the speed of the metamorphosis produced a condition whereby the flooding of the wings with pigment took place before the wing scales

were ready to receive, or reject, it in such situations respectively as would produce the normal pattern. I think this is the first case of this type of heredity to be proved in the Lepidoptera, although it has been demonstrated on many occasions in other orders of life.

Collins in 1927 found an albino strain of barley. It was a simple recessive and controlled by the action of a single factor, but the albino type was only able to express itself when the plants grew at a temperature below 6.5° C., whilst above 18° C. they developed the full amount of chlorophyll and could not be distinguished from normal plants.

A similar gene temperature control has been demonstrated in the Amphipod *Gammarus chevreuxi*, also in Siamese cats and Himalayan rabbits. We shall expect to find it in many more instances in the Lepidoptera and even at present one has suspected it in certain other cases: *L. camilla*, ab. *nigrina*, and *A. paphia*, ab. *melaina*, but so far with no experimental proof.

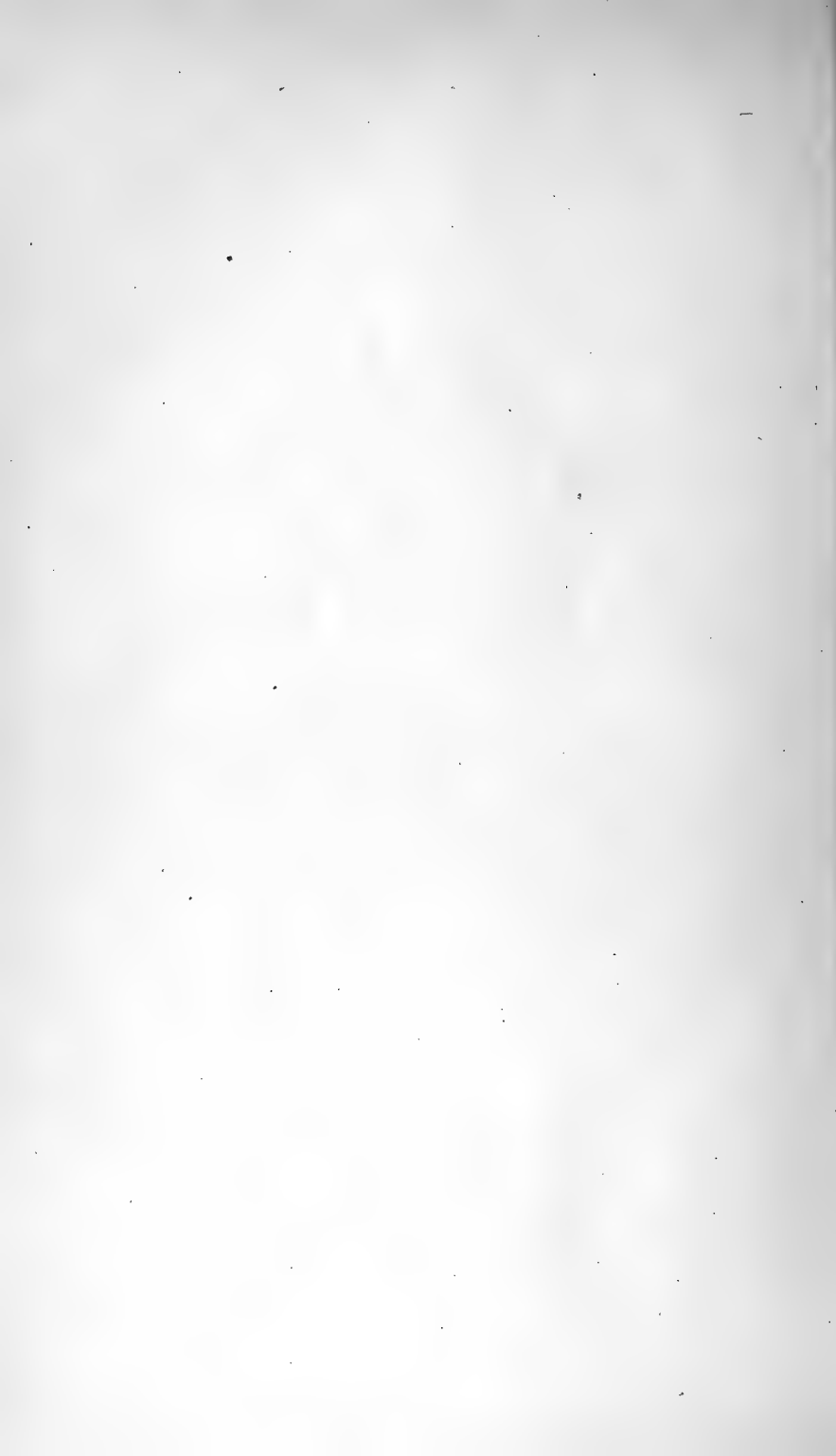
FINAL SUMMARY OF CONCLUSIONS.

There remains for me to review the results of experimenting with these two widely separate species under consideration in regard to temperature. In *H. peltigera* it has been demonstrated that a particular temperature during a critical period decides the ground colour and depth of pattern of the wings, the temperature acting on a normal uniform gene-complex. In *P. dominula* the same point is taken a step farther because the particular characteristic, increased pigment deposit, can only manifest itself in the presence of a particular gene acting in an abnormal environment which is recessive to the typical *dominula* which are the homozygous dominants of the brood and retain their normal pattern in both environments.

Once again the concept of Professor Goodrich has been clearly shown that "no single part or character is completely 'acquired' or due to inheritance alone. Every character is the product both of the factors of inheritance and of environment and can only be reproduced when both are present."

CORRECTIONS.

-
- p. 14, line 17 from bottom, read *Pediacus*.
 - p. 16, lines 12 and 13 from bottom, read *andrenaeformis*.
 - p. 19, line 4 from bottom, read *Heodes phlaeas*, L.
 - p. 22, line 22 from bottom, read *bifa(s)ciata*.
 - p. 26, line 10 from top, read *andrenaeformis*.
 - p. 47, line 7 from top, read *spheciformis*.
 - p. 49, line 10 from top, read Esp. in place of View.



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CORRECTION.—1942-3, Pt. II, p. 27, line 8 from the top: transfer "*Callimorpha (Hypocrita) jacobaeae*, L.—A dark smoky specimen, Dorking, 1942," to follow "through black area," line 11, before "*Arctia*."

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PUBLISHED AT THE SOCIETY'S ROOMS,
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- 1936 BUCK, F. D., 49, Elthorne Road, Holloway Road, London, N.19.
c. A.F.
- 1909 BUCKSTONE, A. A. W., 90, Pains Way, Kingston Road, Ewell, Surrey. *l.*
- 1927 BULL, G. V., B.A., M.B., "White Gables," Sandhurst, Kent. *l.*

YEAR OF
ELECTION.

- 1944 BURNS, B. S., 1, Jamaica Villas, Stoke Road, Gosport, Hants. *l*.
- 1944 BURROWS, D. S., 33, Brookehowse Road, Bellingham, London, S.E.6. *l*.
- 1938 BURTON, Miss MARGARET, L.D.S., R.C.S.ENG., Army Dental Service, Greencot, Seaward Avenue, Barton-on-Sea, Hants. *biology. A.F.*
- 1938 BURTON, R. J., L.D.S., R.C.S.ENG., *Council*, Greencot, Seaward Avenue, Barton-on-Sea, Hants. *l*.
- 1922 BUSHBY, L. C., F.R.E.S., c/o Zoological Society of London, Regent's Park, London, N.W.8. *c, hem.*
- 1937 CARDEW, Col. P. A., *Council*, 21a, Thornton Hill, Wimbledon, London, S.W.19. *l*.
- 1899 CARR, Rev. F. M. B., M.A., L.TH., Ditton Vicarage, Widnes, Lancs. *l, n*.
- 1945 CHARLSON, S., 112, Manchester Road, Tyldesley, Manchester. *l, ent, g*.
- 1936 CHARTRES, S. A., F.R.E.S., 9, King's Drive, Eastbourne, Sussex. *ent*.
- 1922 CHEESEMAN, C. J., 26, Lyndhurst Road, Birkdale, Southport, Lancs. *l*.
- 1945 CLARK, Miss M. J., 1, Anne Boleyn's Walk, Cheam, Surrey. *l*.
- 1936 CLASSEY, E. W., F.R.E.S., R.A.M.C., 117, Sutton Lane, Hounslow, Mdx. *l. A.F.*
- 1943 COATES, R. J., 6, Malvern Road, Surbiton, Surrey. *ent*.
- 1915 COCKAYNE, E. A., D.M., F.R.C.P., F.R.E.S., "Merstone," Tring, Herts. *l, g*.
- 1934 COLE, G. A., M.A., F.C.A., Ronkswood Hospital, Newtown Road, Worcester. *l*.
- 1935 COLLINS, R. J., F.R.E.S., 29, Poplar Avenue, Leatherhead, Surrey. *l*.
- 1899 COLTHRUP, C. W., "Dehra Doon," Tite Hill, Englefield Green, Surrey. *l, oo, orn*.
- 1938 CONDER, G. M., M.R.C.S., L.R.C.P., L.D.S., 33, Grove Avenue, Sutton, Surrey. *l. A.F.*
- 1936 COOPER, B. A., B.SC., A.R.C.S., Dept. of Agriculture, The University, Leeds, 2. *ent. (Life Member.)*
- 1907 COOTE, F. D., F.R.E.S., 32, Wickham Avenue, Cheam, Surrey. *l, b*.
- 1945 CORBET, A. STEVEN, D.SC., PH.D. (LOND.), F.R.I.C., 59, Alexandra Road, Reading, Berks. *ent*.
- 1923 CORK, C. H., 11, Redesdale Street, Chelsea, London, S.W.3. *l*.
- 1919 CORNISH, G. H., 141, Kirkham Street, Plumstead Common, London, S.E.18. *l, c*.
- 1922 COUCHMAN, L. E., F.R.E.S., c/o Mrs A. Couchman, 82, Newbury Road, Bromley, Kent. *l*.

YEAR OF
ELECTION.

- 1909 COULSON, F. J., *Hon. Curator*, "Burnigill," 24, Springfield Avenue, Merton Park, London, S.W.20. *c, hem.*
- 1918 COURT, T. H., F.R.E.S., "Oakleigh," Market Rasen, Lincoln.
- 1943 COUSINS, ROBERT J., A.C.P., M.R.S.T., F.R.E.S., F.R.S.A., F.Z.S., High Street, Ashcott, near Bridgwater, Somerset. *mo, c.*
- 1937 CRABTREE, B. H., F.R.E.S., "Highfield," Alderley Edge, Cheshire. *l.*
- 1934 CRASKE, J. C. B., F.R.E.S., 33, Hinchley Drive, Hinchley Wood, Esher, Surrey. *l.*
- 1937 CRASKE, Capt. R. M., R.A., Beech Hill, Morchard Bishop, Crediton, Devon. *ent. A.F.*
- 1918 CRAUFURD, CLIFFORD, "Denny," Bishops Stortford, Herts. *l.*
- 1933 CREWDSON, R. C. R., F.R.E.S., "The Grange," Delamere, Northwich, Cheshire. *l.*
- 1920 CROCKER, Capt. W., 55, Townley Road, Bexleyheath, Kent. *l.*
- 1932 CROW, P. N., "Heathcote," Bigfrith, Cookham Dean, Berkshire. *l.*
- 1937 CURTIS, A. E., "The Cottage," Ifold Estate, Loxwood, Billingshurst, Sussex. *l.*
- 1927 DANBY, G. C., "Sheringham," 31, Albion Road, Sutton, Surrey. *l.*
- 1940 DAVIS, G. A., 76, Station Road, Chingford, London, E.4. *c. A.F.*
- 1900 DAY, F. H., F.R.E.S., 26, Currock Road, Carlisle. *l, c.*
- 1938 DEAL, JAMES, 18, Manor Road, West Wickham, Kent. *l.*
- 1933 DEMUTH, Lieut. R. P., R.N.V.R., c/o Lloyds Bank, West Southbourne, Bournemouth. *l. A.F.*
- 1889 DENNIS, A. W., 56, Romney Buildings, Millbank, London, S.W.1. *l, mi, b, nat. phot.*
- 1930 DENVIL, H. G., 4, Warwick Road, Coulsdon, Surrey. *l, c. A.F.*
- 1901 DODS, A. W., 35, The Mall, Southgate, London, N.14. *l.*
- 1921 DOLTON, H. L., 36, Chester Street, Oxford Road, Reading, Berks. *l.*
- 1939 DOUBLEDAY, B. S., F.R.E.S., Monks Risborough, Aylesbury, Bucks. *Chalcidoidea.*
- 1936 DOUDNEY, S. P., "Thurne," 110, Foxley Lane, Purley, Surrey. *l.*
- 1930 DUDBRIDGE, B. J., B.A., c/o The Secretariat, Dar-es-Salaam, Tanganyika. *ent.*
- 1927 EAGLES, T. R., *Hon. Editor of Proceedings*, 32, Abbey Road, Enfield, Middlesex. *l, c.*
- 1943 EASTMURE, D. F., "Granta," 43, Muswell Road, Muswell Hill, London, N.10. *l. A.F.*
- 1937 EASTON, N. T., D.F.H., F.R.E.S., 25, Lambolle Road, London, N.W.3. *l, g, nat. phot.*
- 1941 EDWARDS, Rev. Canon T. G., M.A., F.Z.S., Holy Trinity Vicarage, Tulse Hill, London, S.W.2. *l.*
- 1933 ELGOOD, W. S., M.A., North Brink, Wisbech, Cambs. *l.*
- 1937 EMBRY, B., F.R.E.S., 23, Mill Drove, Uckfield, Sussex. *l. A.F.*

**YEAR OF
ELECTION.**

- 1932 ENNIS, L. H., c/o "Bandora," Portmore Park Road, Weybridge, Surrey. *l. A.F.*
- 1935 ENSOR, G. A. "Oakleigh," Knoll Road, Dorking, Surrey. *l. hym.*
- 1920 FARMER, J. B., "Ashleigh," Beatrice Road, Oxted, Surrey. *l. c.*
- 1924 FASSNIDGE, WM., M.A., F.R.E.S., 4, Bassett Crescent West, Southampton. *l. n. hem.*
- 1930 FERRIER, W. J., F.R.E.S., 86, Portnalls Road, Coulsdon, Surrey. *l. A.F.*
- 1936 FINNIGAN, W. J., *Council*, 87, Wickham Avenue, Cheam, Surrey. *ent, nat. phot.*
- 1943 FORD, E. B., M.A., D.SC., The University Museum, Orford. *ent, g.*
- 1920 FORD, L. T., *Vice-President*, "St Michaels," 70, Park Hill Road, Bexley, Kent. *l.*
- 1941 FORD, R. L. E., F.R.E.S., F.Z.S., "Durfold," 34, Park Hill Road, Bexley, Kent. *ent.*
- 1939 FORSTER, H. W., 76, Station Road, Chingford, London, E.4. *c.*
- 1915 FOSTER, T. B., "Downlands," 24, York Road, Selsdon, Surrey. *l.*
- 1933 FRASER, ANGUS, The Palace, Cuddesdon, Oxford. *c.*
- 1943 FRASER, G. de C., Warren Mount, Freshfield, near Liverpool. *ent.*
- 1943 FRASER, Mrs G. de C., Warren Mount, Freshfield, near Liverpool. *ent.*
- 1930 GILLIAT, F. T., B.A., F.R.E.S., Two Brewers Inn, Chipperfield, Herts. *l.*
- 1929 GLEGG, D. L., F.R.E.S., "Birchstone," Coombe Park, Kingston, Surrey. *l.*
- 1936 GOODBAN, B. S., 81, West Street, Ewell (Epsom), Surrey. *l. A.F.*
- 1935 GOODLIFFE, F. D., M.A., F.R.E.S., Lord Wandsworth Agricultural College, Long Sutton, Basingstoke. *ec. ent.*
- 1942 GOODSON, A. L., 26, Park Road, Tring, Herts. *l.*
- 1926 GORDON, D. J., B.A., F.R.E.S., Table Office, House of Commons, London, S.W.1. *c, l.*
- 1936 GOWING-SCOPES, E., "Oakhurst," Oakwood Road, Crofton, Orpington, Kent. *l. A.F.*
- 1924 GRANT, F. T., 37, Old Road West, Gravesend, Kent. *l, c.*
- 1926 GREY, Mrs OLIVE, F.Z.S., 66, Barrington Court, Pages' Hill, London, N.10. *ent.*
- 1945 HAMERTON, J. L., 11, Linkway, London, S.W.20. *l, od.*
- 1891 HAMM, A. H., M.A., A.L.S., F.R.E.S., 22, Southfield Road, Oxford. *l.*
- 1944 HAMMOND, H. E., 16, Elton Grove, Birmingham, 27. *l, ent.*
- 1943 HARDS, C. H., F.R.E.S., 40, Riverdale Road, Plumstead, London, S.E.18. *l.*
- 1902 HARE, E. J., F.R.E.S., Harrow Place, Pinden, Dartford, Kent. *l.*
- 1943 HARPER, Lieut.-Comr. G. W., R.N., Bramblewood, Bushby Avenue, Rustington, Sussex. *l. A.F.*
- 1936 HARRIS, W. H. A., 48, Corringway, London, W.5. *l.*

YEAR OF
ELECTION.

- 1924 HARWOOD, P., F.R.E.S., Laurel Bank, Aviemore, Inverness-shire, N.B. *l, c.*
- 1927 HAWGOOD, D. A., 2, Kingsmead Road, Tulse Hill, London, S.W.2. *l.*
- 1924 HAWKINS, Capt. C. N., F.R.E.S., *Hon. Secretary (Minuting)*, 23, Wilton Crescent, Wimbledon, London, S.W.19. *l, g.*
- 1929 HAWLEY, Lt.-Col. W. G. B., D.S.O., "Amber Cottage," Bodenhams, near Salisbury, Wilts. *l.*
- 1943 HAYNES, H., 6, Nelson Road, Salisbury, Wilts. *l.*
- 1938 HAYNES, R. F., "The Sanctuary," Burney Road, West Humble, Dorking, Surrey. *l. A.F.*
- 1923 HAYWARD, Capt. K. J., F.R.E.S., F.Z.S., F.R.G.S., Instituto Miguel Lillo, Calle Miguel Lillo, 205, Tucuman, Republica Argentina. *l, orn, c.*
- 1935 HEDGES, A. V., F.R.E.S., "Ballovale," Santon, Isle of Man. *l.*
- 1920 HEMMING, Capt. A. F., C.M.G., C.B.E., F.Z.S., F.R.E.S., c/o Ministry of Fuel and Power, Dean Stanley Street, London, S.W.1. *l.*
- 1924 HENDERSON, J. L., *Hon. Treasurer*, 6, Haydn Avenue, Purley, Surrey. *c.*
- 1931 HESLOP, I. R. P., M.A.; F.R.E.S., c/o Messrs Griffiths and McAlister, 10, Warwick Street, Regent Street, London, W.1. *l.*
- 1937 HICK, E. PENTLAND, F.R.E.S., "Athol House," Fulford Road, Scarborough, Yorks. *l. A.F.*
- 1944 HITCHINS, Capt. P. E. N., B.Sc., Sickiebank, Horam, Sussex. *ent.*
- 1944 HODGSON, S. B., 5, Charles Street, Berkhamstead, Herts. *l.*
- 1943 HOLLEBONE, Comr. L. H. T., O.B.E., R.N., 74, Kensington Court, Kensington, London, W.8. *A.F.*
- 1945 HOWARD, A. P., 19, Limes Avenue, Mill Hill, London, N.W.7. *ent.*
- 1927 HOWARD, Sq. Ldr. J. O. T., M.A., R.A.F.V.R., c/o Barclays Bank, Ltd., 161, New Bond Street, London, W.1. *l. A.F.*
- 1931 HOWARTH, T. G., B.E.M., F.R.E.S., 77, Woodland Rise, Muswell Hill, London, N.10. *l. A.F. (Prisoner of War.)*
- 1934 HUGGINS, H. C., F.R.E.S., 875, London Road, Westcliff-on-Sea, Essex. *l, ent.*
- 1929 HUGHES, ARNOLD W., Lower Farm, Quainton, Bucks. *l.*
- 1939 HULLS, L. G., F.C.S., F.R.M.S., F.R.E.S., "Rax," Chidham, near Chichester, Sussex. *ent.*
- 1938 HUMPHREYS, J. A., The Caravan, Ballyhilly, Turnberry, By Girvan, Ayrshire. *l.*
- 1933 HUTCHINGS, H. R., 127, Chadacre Road, Stoneleigh, Surrey. *l.*
- 1928 JACKSON, F. W. J., "The Pines," Ashted, Surrey.
- 1940 JACKSON, Capt. REGINALD A., R.N., F.R.E.S., *President*, "The Hermitage," Bishops Waltham, Hants, and the Junior United Services Club, London, S.W.1. *ent, l. A.F.*

YEAR OF
ELECTION.

- 1923 JACOBS, S. N. A., *Vice-President*, "Ditchling," 54, Hayes Lane, Bromley, Kent. *l, e l.*
- 1924 JAMES, A. R., "Braemar," Morgan Crescent, Theydon Bois, Essex. *l.*
- 1936 JAMES, W. H. *l. A.F.*
- 1928 JANSON, O. J., F.R.E.S., *Recorder*, 15, Kingshill Crescent, St Albans, Herts. *ent.*
- 1942 JAQUES, J. M., 12, Coulsdon Road, Coulsdon, Surrey. *l.*
- 1925 JARVIS, C. MACKECHNIE, F.L.S., 68, Clyfford Road, West End Road, Ruislip, Middlesex. *c.*
- 1938 JARVIS, F. V. L., B.SC., 21, Shirley Avenue, Sutton, Surrey. *l, g. A.F.*
- 1943 KERSHAW, Col. S. H., D.S.O., Alderman's Place, Aspley Heath, Bletchley, Bucks. *l.*
- 1928 KETTLEWELL, H. B. D., M.A., M.B., B.CHIR., M.R.C.S., L.R.C.P., F.R.E.S., *Council*, "Homefield," The Common, Cranleigh, Surrey. *g, l.*
- 1910 KIDNER, A. R., "Starfell," Southdown Road, Seaford, Sussex. *l.*
- 1925 KIMMINS, D. E., R.A.F., 3, Avington Grove, Penge, London, S.E.20. *l, n. A.F.*
- 1933 KING, H., D.SC., F.R.S., "Gavarnie," Wise Lane, Mill Hill, London, N.W.7. *l, orn.*
- 1944 KLOET, G. S., F.Z.S., F.R.E.S., 8, Knutsford Road, Wilmslow, Cheshire. *ent.*
- 1925 LABOUCHERE, Lt.-Col. F. A., F.R.E.S., 15, Draycott Avenue, Sloane Square, London, S.W.3.
- 1945 LANG, R. M., A.C.A., 9, Tabor Gardens, Cheam, Surrey. *l.*
- 1941 LAST, H. R., *Council*, 12, Winkworth Road, Banstead, Surrey. *c, l.*
- 1927 LAWSON, H. B., F.R.E.S., "Churchmead," Pirbright, Surrey. *l.*
- 1914 LEEDS, H. A., Wood Walton, Huntingdon. *l.*
- 1934 LINE, H. V., 11, Priory Avenue, Petts Wood, Orpington, Kent. *l.*
- 1933 LIPSCOMB, Major C. G., Misterton, Somerset. *l. A.F.*
- 1937 LISNEY, A. A., M.A., M.B., F.R.E.S., The Red House, Narborough, Leicester. *l.*
- 1942 LLOYD, Major C. T., D.SC., PH.D., 25, Belmont Avenue, New Malden, Surrey. *l.*
- 1935 LOWE, Major J. H. B., R.E., c/o Lloyds Bank Ltd., Cox's & King's Branch, 6, Pall Mall, London, S.W.1. *l. A.F.*
- 1931 MACNULTY, B. J., "Rutland," 67, All Saints Road, Sutton, Surrey. *l. A.F.*
- 1892 MAIN, H., B.SC., F.R.E.S., F.Z.S., 9, Woodside Road, Woodford Wells, Essex. *l, nat. phot, c.*
- 1889 MANSBRIDGE, W., M.SC., F.R.E.S., "Monreith," Derby Road, Formby, Liverpool, Lancs. *l, c.*
- 1932 MARCON, Rev. J. N., Christ Church Vicarage, Seaside, Eastbourne, Sussex. *l.*

YEAR OF
ELECTION.

- 1930 MARSH, Capt. DUDLEY G., Gara-Tor, Pigeon Lane, Eddington,
Nr. Herne Bay, Kent. *l. A.F.*
- 1922 MASSEE, A. M., D.S.C., F.R.E.S., East Malling Research Station,
Kent. *l.*
- 1943 MATTHEWS, J. K., M.A., Greystoke, Freshfield, near Liverpool.
l, b, orn.
- 1932 MELLOWS, W. T., M.B.E., LL.B., "The Vineyard," Minster
Precincts, Peterborough, Northants. *l.*
- 1942 METCALFE, PERCY, C.V.O., R.D.I., A.R.C.A., 70, Madrid Road,
Barnes, London, S.W.13. *l.*
- 1943 MILTON, P. W., 23, Woodstock Road, Carshalton, Surrey. *c, ent.*
- 1938 MINNION, W. E., 57, Lloyd Court, Pinner, Middlesex. *l. A.F.*
- 1944 MOODY, NORMAN H., 119, Southampton Road, Ringwood, Hants.
ent, orn.
- 1945 MOORE, JOHN W., F.R.E.S., Middleton Dene, 151, Middleton Hall
Road, King's Norton, Birmingham, 30. *e, rhopalocera.*
- 1889 MOORE, H., F.R.E.S., 9 Hoopwick Street, Deptford, London, S.E.8.
l, hem, d, e l, e hym, e d, mi.
- 1920 MORISON, G. D., B.S.C., PH.D., F.R.E.S., Dept. Advisory Entomo-
logy. N. of Scotland Agricultural College, Marischal College.
Aberdeen, N.B. *ec. ent.*
- 1930 MORLEY, A. McD., O.B.E., M.A., 9, Radnor Park West, Folkestone,
Kent.
- 1937 MORTIMER, D. A., 31, Junction Street, Dudley, Worcs. *hym.*
A.F.
- 1940 MORTIMER, Mrs D. A., 31, Junction Street, Dudley, Worcs. *ent.*
- 1937 MOWBRAY, M. J., 80, Woodlands Avenue, Wanstead, London,
E.11. *ent. A.F.*
- 1935 MULLER, Miss I. M., "Appledore," Mugswell, Chipstead, Surrey.
ent.
- 1945 MURRAY, Rev. D. P., The Priory, Wellington Street, Leicester. *l.*
- 1934 MUSGRAVE, A. J., B.S.C., A.R.C.S., F.R.E.S., 21 Loveday Road, Lon-
don, W.13. *ent.*
- 1906 NEWMAN, L. W., Salisbury Road, Bexley, Kent. *l.*
- 1945 NEWTON, J. L., M.R.C.S., L.R.C.P., Alconbury Hill, Huntingdon.
l, b.
- 1930 NIBLETT, M., 10, Greenway, Wallington, Surrey. *galls.*
- 1938 ODD, D. A., 11, Wickham Avenue, Cheam, Surrey. *l.*
- 1932 O'FARRELL, A. F., B.S.C., A.R.C.S., F.R.E.S., Chyngton, Steyning
Road, Rottingdean, Sussex. *od, cr, ent.*
- 1934 OLIVER, G. B., Harefield Road, Luton, Beds. *l.*
- 1943 OLIVER, G. H. B., "Corydon," Amersham Road, Hazlemere,
High Wycombe, Bucks. *l.*
- 1942 PARFITT, R. W., 1, Dunsdon Avenue, Guildford, Surrey. *l.*
- 1940 PAYNE, L. G., 22, Marksbury Avenue, Richmond, Surrey. *c.*
- 1940 PAYNE, R. M., c/o 22, Marksbury Avenue, Richmond, Surrey. *c.*

YEAR OF
ELECTION.

- 1940 PELHAM-CLINTON, EDWARD C., B.A., Trebles Holford, Bishops Lydeard, near Taunton, Somerset. *l. A.F.*
- 1928 PERKINS, J. F., B.Sc., F.R.E.S., 42, Wordsworth Road, Harpenden, Herts. *hym.*
- 1944 PERRY, K. M. P., 21, Cornwall Road, Cheam, Surrey. *c.*
- 1933 PEYTON, A. G., 29, Grove Road, Ramsgate, Kent. *l.*
- 1944 PICKARD, JAMES N., PH.D., M.A., F.R.S.E., Craufurd, Mill Lane, Sawston, Cambs. *l, g.*
- 1933 PINNIGER, E. B., F.R.E.S., Dalegarth, 5, Endlebury Road, Chingford, London, E.4. *od, n. l.*
- 1943 PITMAN, C. M. R., "Malvern," Southampton Road, Clarendon, Salisbury, Wilts. *l, orn. b, etc.*
- 1924 PRIEST, C. G., 5, Kensal Road, Paddington, London, W.10. *l.*
- 1922 RAIT-SMITH, W., F.Z.S., F.R.E.S., F.R.H.S., "Hurstleigh," Linkfield Lane, Redhill, Surrey. *l.*
- 1942 RICHARDSON, AUSTIN, M.A., F.R.E.S., Beaudesert Park, Minchinhampton, Glos. *l.*
- 1920 RICHARDSON, A. W., F.R.E.S., 28, Avenue Road, Southall, Middlesex. *hym.*
- 1936 RICHARDSON, N. A., 20, Bletchley Road, Bletchley, Bucks. *l. A.F.*
- 1934 RIDEOUT, J. K., "Hodgsonites," Charterhouse, Godalming, Surrey. *ent. (Life Member.)*
- 1945 RILEY, J. A., 7, McKay Road, Wimbledon, London, S.W.20. *l, od.*
- 1908 RILEY, Capt. N. D., F.R.E.S., F.Z.S., 7, McKay Road, Wimbledon, London, S.W.20. *l.*
- 1910 ROBERTSON, G. S., M.D., "Struan," Storrington, near Pulborough, Sussex. *l.*
- 1942 ROCHE, P. J. L., M.R.C.S., L.R.C.P., F.R.E.S., c/o D.M.S., Lagos, Nigeria. *c, hem.*
- 1935 ROYFFE, D. W., 99, Hughenden Road, High Wycombe, Bucks. *c, ent. A.F.*
- 1932 RUDLAND, W. L., F.R.E.S., 211, Caversham Rd., Reading, Berks. *l.*
- 1932 RUSSELL, A. G. B., C.V.O., F.R.E.S., Lancaster Herald, "Scarbank," Swanage, Dorset. *l.*
- 1915 RUSSELL, S. G. CASTLE, "Springetts," Seaview Road, Highcliffe-on-Sea, Hants. *l.*
- 1908 ST AUBYN, Capt J. G., F.R.E.S., 14, Purley Knoll, Purley, Surrey.
- 1927 SCOTT, Col. E., M.B., "Hayesbank," Ashford, Kent. *l. A.F.*
- 1923 SEVASTOPULO, D. G., F.R.E.S., c/o Ralli Bros., Ltd., Calcutta. *(Life Member.) l.*
- 1933 SHARMAN, F. W., 183, Star Road, Peterborough, Northants. *l.*
- 1938 SHERRIN, W. R., A.L.S., F.Z.S., South London Botanical Institute, 323, Norwood Road, Herne Hill, London, S.E.24. *c, l.*
- 1939 SIVITER SMITH, P., F.R.E.S., c/o 66, Stirling Road, Edgbaston, Birmingham, 16. *l.*

YEAR OF
ELECTION.

- 1921 SMART, Major H. DOUGLAS, M.C., M.D., B.S., F.R.E.S., Roselands, West Barnham, Bognor Regis, Sussex. *l.*
- 1941 SMITH, Lieut. FDK. WM., R.N.V.R., "High Mains," Closeburn, Dumfries: *l, hym. A.F.*
- 1939 SMITH, S. GORDON, F.L.S., F.R.E.S., "Estyn," Boughton, Chester. *ent.*
- 1938 SNELL, B. B., F.R.E.S., "Woodsome," Bromborough, Cheshire. *l. A.F.*
- 1941 SPARROW, R. W., M.INST.R.A., *Council*, 134, Regents Park Road, London, N.3. *l.*
- 1943 SPREADBURY, W. H., 35, Acacia Grove, New Malden, Surrey.
- 1938 STAFFORD, A. E., "Corydonis," 83, Colborne Way, Worcester Park, Surrey. *l.*
- 1927 STANLEY-SMITH, F., F.R.E.S., *Hon. Secretary (Corresponding)*, "Hatch House," Pilgrim's Hatch, near Brentwood, Essex. *l.*
- 1928 STANLEY-SMITH, Mrs MAUD, "Hatch House," Pilgrim's Hatch, near Brentwood, Essex. *l.*
- 1937 STEDALL, H. P. P., "Cherry Cottage," Prestwood, Great Missenden, Bucks. *ent.*
- 1940 STEEL, W. O., 16, Upsdell Avenue, Palmers Green, London, N.13. *c.*
- 1935 STEPHENS, J. A., F.R.E.S., 44, Mount Road, Chatham, Kent. *c.*
- 1938 STERLING, D. H., 36, Estella Avenue, New Malden, Surrey. *l. A.F.*
- 1942 STIDSTON, Eng. Capt. S. T., R.N., F.R.E.S., 1, Palace House, Bayswater Road, London, W.2, and "Ashe," Ashburton, Devon. *l. A.F.*
- 1936 STIGANT, Miss B., Oldlands, Passfield, Bordon, Hants. *hortic. ent.*
- 1924 STOREY, W. H., c/o Barclays Bank, High Street, Shoreditch, London, E.1. *ent. A.F. (Prisoner of War.)*
- 1931 STOVIN, G. H. T., M.R.C.S., L.R.C.P., 36, Wymondley Road, Hitchin, Herts.
- 1929 STUBBS, G. C.
- 1939 SUMMERS, E. J., 7, Cavendish Road, Sutton, Surrey. *c, hem.*
- 1934 SUTTON, GRESHAM R., 6, Kenilworth Gardens, Loughton, Essex. *l, c.*
- 1945 SUTTON, R., 20, Ongar Road, Fulham, London, S.W.6. *l.*
- 1943 SWANN, E. L., 282, Wootton Road, King's Lynn, Norfolk. *c.*
- 1916 SYMS, E. E., F.R.E.S., F.Z.S., *Hon. Librarian*, 22, Woodlands Avenue, Wanstead, London, E.11. *n, orth, od, t.*
- 1942 TALBOT, M. J. R., c/o The Foreign Office, S.W.1. "By Angora Bag." *l.*
- 1913 TATCHELL, L. S., F.R.E.S., "Rockleigh Cottage," Swanage, Dorset. *l.*
- 1941 TAYLOR, H. G. W., 11, Granville Road, Sidcup, Kent. *c.*
- 1934 TAYLOR, J. O., 64, Great Thrift, Petts Wood, Kent. *l.*
- 1925 TAYLOR, J. SNEYD, M.A., F.R.E.S., P.O. Box 23, Fort Beaufort, Cape-Province, Union of S.A. *l.*

YEAR OF
ELECTION.

- 1944 TELSCH, Sgt. THEO. M., 33593443, H.Q. Command, H.Q. Det.,
Eng. Section, E.T.O.U.S.A., A.P.O.887, c/o U.S. Army. *c*
(*elateroidea*). *A.F.*
- 1938 TETLEY, J., "White Cottage," Silverlea Gardens, Horley, Surrey.
ent.
- 1931 THOMPSON, J. ANTONY, F.R.E.S., Bishopswood, Prestatyn, N.
Wales. *l.*
- 1935 TOMPKINS, F. H., "Clifton," 18, Forest Side, Worcester Park,
Surrey. *ent.*
- 1937 TONGE, A. E., F.R.E.S., "Ashville," Trafford Road, Alderley Edge,
Cheshire. *l.*
- 1934 TUNSTALL, H. G., 11, St James Avenue, Ewell, Surrey. *l.*
- 1940 TURNER, A. D., 19, Wychwood Close, Canon's Park, Middlesex.
ent.
- 1944 TURNER, H. J., 33, Pine Avenue, W. Southbourne, Nr. Bourne-
mouth, Hants. *l.*
- 1943 TURNER, J. FINCHAM, 17, Litchfield Avenue, Morden, Surrey. *l,*
hym.
- 1944 WAINWRIGHT, CHARLES, B.SC., F.R.I.C., 216, St Bernards Road,
Olton, Warwickshire. *l.*
- 1889 WAINWRIGHT, COLBRAN J., F.R.E.S., 11, Surrey Road, Bourne-
mouth, Hants. *l, d.*
- 1929 WAINWRIGHT, J. CHAS., 9, Priory Road, Hook Road, Surbiton,
Surrey. *l.*
- 1911 WAKELY, Sir LEONARD D., K.C.I.E., C.B., *Council*, 37, Marryat Road,
Wimbledon, London, S.W.19. *l.*
- 1930 WAKELY, S., *Council*, 17, Warminster Road, S. Norwood, London,
S.E.25. *l.*
- 1935 WALLIS-NORTON, Capt. S. G., R.A.S.C., 50, Christchurch Road,
Winchester, Hants. (*Life Member.*) *ent. A.F.*
- 1944 WALTON, ANTHONY M., F.R.E.S., 275, Croxted Road, West Dulwich,
London, S.E.21, and Hertford College, Oxford. *l.*
- 1936 WARRIER, R. E., "Birchwood," Birchwood Park Avenue, Swan-
ley, Kent. *l.*
- 1939 WATKINS, Lieut. N. A., M.A., F.R.E.S., R.N.V.R., Belcombe Court,
Bradford-on-Avon, Wilts. *l. A.F.*
- 1920 WATSON, D., "Crossways," Hightown, Ringwood, Hants. *l.*
- 1928 WELLS, CLIFFORD, "Dial House," Crowthorne, Berks. *l.*
- 1911 WELLS, H. O., "Linden House Hotel," 9 College Road, Epsom,
Surrey. *l.*
- 1937 WELTI, A., F.R.E.S., "Foxbush," Tillingdown Lane, Caterham,
Surrey. *l.*
- 1911 WHEELER, The Rev. G., M.A., F.Z.S., F.R.E.S., "Ellesmere," Grat-
wicke Road, Worthing, Sussex. *l.*
- 1927 WHITE, A. GRANVILLE, F.C.A., "Hilltop," Chaldon, Surrey.
- 1945 WILLIAMS, E. F., F.R.E.S., Little Pasture, Brentwood, Essex. *l.*

- 1925 WILLIAMS H. B., LL.D., F.R.E.S., "Croft Point," Bramley, Surrey. *l, g.*
- 1932 WILLIAMS, S. W. C., 17, Beresford Road, Chingford, London, E.4. *l, g.*
- 1938 WILLIS, J. R., "Vine Cottage," West Horsley, Surrey. *l. A.F.*
- 1926 WOOTTON, W. J., "Wannock Gardens," Polegate, Sussex. *l.*
- 1927 WORMS, The Baron DE, M.A., PH.D., F.R.I.C., F.R.E.S., M.B.O.U., *Council*, Milton Park, Egham, Surrey. *l, orn.*
- 1945 WYKES, N. G., Carter House, Eton College, Windsor, Berks. *l.*
- 1944 YGLESIAS, H. R., B.A., 4, College Hill, Cannon Street, London, E.C.4. *l.*

Members will greatly oblige by informing either of the Hon. Secretaries of any errors in, additions to, or alterations required in the above addresses and descriptions.

COUNCIL'S REPORT FOR 1944.

At the close of another war year your Council is happy to report that membership has increased; interest in meetings has been sustained; the standard of the publication has been fully maintained. We have been fortunate in that the property of the Society and the rooms we occupy have escaped damage by enemy action.

Membership at 31st December 1944 numbered 280, a new high record, made up of 4 Honorary, 4 Life, 204 Full and 68 Country Members, but this includes 49 serving with the Armed Forces, who are excused from paying subscriptions, so we are out of touch with many of them and can but hope that they retain their interest in the Society. During the year 1 member was killed in action, the deaths of 6 members were recorded, 1 resigned, 13 new members were admitted and 2 were re-instated.

Your Council particularly wishes to mention the grievous loss suffered by the Society during the year by the death of Mr Sidney R. Ashby, its highly-esteemed Hon. Curator. He joined the Society in 1895; in 1908 he was appointed assistant to Mr W. West, who had been Honorary Curator from the formation of the Society in 1872; in 1921 he succeeded to the Curatorship. The benefit of this long continuity of service by two such men has been of inestimable value to the Society. During his administration Mr Ashby completely reorganised and rearranged the whole of our now extensive collections, finishing only last year. In appointing Mr F. J. Coulson in his stead, your Council feels sure that his zeal and his extensive knowledge of all orders of insects will enable him to fill the big gap thus created. Another loss from your Council during the year arose from the death of Mr Rippon, a valued Ordinary Member of Council and a benefactor to the Society. This vacancy was filled for the remainder of the year by the appointment of The Baron de Worms.

At the end of the year your Council was regretfully obliged to accept the resignation, due to failing eyesight, of our eminent Honorary Editor of *Proceedings*, Mr Henry J. Turner. Mr Turner, who joined the Society in 1887, became Report Secretary in 1893, and except for a break that was probably little more than nominal when he was President in 1916 and 1917, continued in that office till 1935. In 1918 he added the responsibilities of Editor to his other duties. During his regime he raised the standard of our *Proceedings and Transactions* to a level which has earned us recognition as one of the leading entomological societies of this country. Mr Turner was made an Honorary Member in 1935 and on completing 50 years' membership he was presented with an album containing as far as possible the signatures of all members. In further recognition of his pre-eminent services to the Society your Council have now elected him as our first Honorary Life President. Beyond

that, the best tribute we can pay him is to resolve to maintain the high standard in our *Proceedings* that he has established. In his letter of resignation, Mr Turner says: "It has been one of the pleasures of my life to belong to the Society, to have retained membership until I have seen a third generation take the reins, and to see so many members become enthusiastic in the carrying on of the Society." Mr Turner, who has turned 88 years of age, long since retired from his professional duties; we wish him every happiness for the future.

Our cordial relations with the Cathedral Chapter have been drawn still closer by personal contact with the new Provost, the Very Reverend C. K. N. Bardsley, following his institution after a long interregnum. The new gas heaters installed in our meeting room at our request have made conditions much more comfortable for our winter meetings.

We must remind members of their continued indebtedness to Prof. Hale Carpenter and the Hope Department of Entomology at Oxford for their care and custody of the "Bright Collection."

At the 11 ordinary meetings during the year papers by Rev. Canon Edwards, Messrs W. H. Spreadbury and M. Niblett, Col. P. A. Cardew, Messrs F. D. Coote, R. W. Sparrow, H. A. Leeds, S. Wakely and E. E. Syms were read. The average attendance was 27. The lantern was in use on 3 occasions.

Your Council feels that the annual Exhibition held in October can again be considered highly successful. If the exhibits were not quite so numerous as last year, this can well be understood in view of the limitations on our individual collecting activities; while several members who usually have large exhibits were prevented by illness from being there. The recorded attendance at 192 was slightly higher than last year. Refreshments provided by the Society were served by lady members and friends, to whom our thanks have been conveyed.

To obtain a fuller knowledge of the fauna and flora of Ashtead Woods, it had been intended to have a Field Meeting there once a month during the season. The flying bomb menace in midsummer and bad weather since June interfered somewhat with this programme as well as with other Field Meetings. A few were abandoned; attendance at others was very small. Besides the Ashtead meetings others were held at Bookham, Oxshott, Effingham and Wisley (2), Horsley, and Boxhill (2).

Sets of our lantern slides have been lent on two occasions. The Council would like to see more extensive use made of our very comprehensive series of slides of lepidoptera in all stages, and invites applications from members for the loan of slides or sets.

A project which your Council has had in mind is to stage an exhibition of apparatus and demonstration of entomological methods for the benefit of schools. It is hoped it may be possible to arrange this during the coming Easter holidays.

The *Proceedings and Transactions* for 1943/44, published in one part on 4th July 1944, consisted of xx plus 86 pages with 2 coloured and 2

black-and-white plates. Your Council plans in future to bring out each year at least one paper dealing with the British species of a genus or group of the micro-lepidoptera, illustrated by a coloured plate. When the whole or a substantial part of the sub-order has been covered, it is hoped to collect and publish the papers in book form. Mr S. N. A. Jacobs' paper read in 1942 on the genus *Lithocolletis* is being published this year, as is the paper read in November by Mr S. Wakely on the genus *Mompha*, each being illustrated by a coloured plate drawn by Mr Jacobs. Extra copies of the plates are being stored for the republication. Further "micro" papers have been promised by the same experts and also by Mr L. T. Ford, Mr S. C. Scarsdale Brown, and other authorities. The Treasurer is building up a fund to meet the heavy cost of the plates, which worthy objective we commend to the generosity of all members. Work is also being done on the preparation of an index of food plants for the micro-lepidoptera on the lines of Scorer's Log Book for the Macros. Mr J. Antony Thompson is working on *Pieris napi* and promises a paper thereon.*

Generous gifts to our funds during the year are specified in the Treasurer's report. Your Council would have wished, on behalf of the Society, publicly to have expressed its gratitude to the individual donors, but as they prefer to remain anonymous all we can do is to convey our thanks here and, privately, through the Treasurer. The late Mr Rippon presented an opaque lantern screen on rollers. It has been mounted in the meeting room. Mr R. J. Collins presented 10 aberrations of Geometridae (Lep.) and Mr H. W. Andrews a box of Diptera. Other insects were given by various members. The thanks of the Society have been suitably expressed to the donors.

The Librarian reports that this year some 125 volumes have been issued to members, of which number 47 were sent by post. This is a considerable increase on the number issued last year. Binding during the year has again been restricted so that our expenditure on this item after the war will need to be considerable.

ADDITIONS TO LIBRARY, 1944-45.

Donations.—By Brit. Mus. Nat. Hist.: *Common Insect Pests of Stored Food Products; Lice; The Bed-Bug*. By Mr R. J. Collins: Guenée's *Histoire Naturelle des Insectes Lépidoptères*, Vols. 9 and 10. By Mr A. W. Dennis: G. Bentham's *Handbook of British Flora*, 2 Vols.; T. Moore's *British Ferns and their Allies*; Lord Avebury's *Notes on the History of British Flowering Plants*; Oliver's *Lessons in Elementary Botany*; E. W. Swanton's *British Plant Galls*; W. E. Sharpe's *Common Beetles of our Countryside*; J. W. Tutt's *British Butterflies*; E. F. Dalglish's *Marvels of Plant Life*; C. Cooke's *Rusts, Smuts, Mildews and Moulds*; G. S. Lefevre's *English Commons and Forests*. By Capt.

*Members working on particular insects or subjects are requested to advise one of the secretaries so that it may be made generally known and serve to focus developments. Lists will be published from time to time.

Hayward of the Argentine: 4 separates. By Mr D. G. Sevastopulo: 13 separates of his papers on *The Foodplants of Indian Lepidoptera*. By Mr W. H. Spreadbury: T. A. Coward's *British Birds*, 3 Vols. By the Lancashire and Cheshire Entomological Society: Reports from 1916 to 1939, inclusive. By Mr A. W. Mansbridge: Pierce's *Genitalia of the Noctuidae (Females)*; Pierce and Metcalfe's *Genitalia of the Tineid Families of British Lepidoptera* and *The Genitalia of the Pyrales, Deltoids and Plumes*; Pierce and Beirne's *Genitalia of the British Rhopalocera and Large Moths*.

By Purchase or Exchange.—British Association for Advancement of Science, Vol. 3, No. 9. British Museum Nat. Hist.: *Insects of Medical Importance*. *Trans. Soc. for British Entomology*, Vol. 8, Parts 6 and 7. *Trans. Carlisle Nat. Hist. Soc.*: "Birds of Lakeland." *Trans. Connecticut Acad. Arts and Sciences*, July 1944, in 4 Parts, i.e., "Control of Cedar Apple Rust," by R. P. Marshall; "Spiders of Amber," by Alex. Petrunkevitch; "Digestive Enzymes of Spiders," by G. E. Pickford; and "Problems of Biogeochemistry." *Entomological News*, 1944. *Entomologist*, 1944. *Entomologist's Monthly Mag.*, 1944. *Entomologist's Record*, 1944. *Essex Naturalist*, Vol. 27, Parts 8 and 9. *Report of Haslemere Educational Museum*. *Proc. of Royal Irish Academy*, Nos. 49B, 12, 13, 14, and 15. *Proc. of Isle of Wight Nat. Hist. Soc.*, 1943. *Annual Report Lancashire and Cheshire Ent. Soc.*, 1940-1943 (1 Vol.). *Lloydia*, 1944. *London Naturalist and Bird Report*, 1943. *Natural History* (New York), 1940-1944. *Report of Smithsonian Institute*, 1942 and 1943. *South-Eastern Naturalist*, 1943. *Trans. and Proc. Torquay Nat. Hist. Soc.*, 1942-3. *Natural History*, U.S.A., 1944.

HON. TREASURER'S REPORT, 1944.

I am glad to be able to make an encouraging report. Not only did we pay our way in 1944, but in addition we were able to make provision for anticipated heavy expenses in the near future. The Council's report, which you will be hearing soon, paints an alluring picture of future activities. It would be a great pity were such valuable work hampered by lack of funds. If the staunchness of subscribing members and the generosity of benefactors, as seen in the past year, is a portent for the future, there should be no risk of this, for we have been able to raise our Special Funds from a total of £39 4s 1d to £104 8s 9d.

On every side I have found that ready and practical support which is so heartening to a Treasurer. When I addressed you a year ago I asked for an increase in the number of those making a small addition to their subscription to help the Publication Fund. There was an immediate response from among those who heard me. When later my report was received by others who cannot attend our meetings more contributions arrived. Several of our serving members made donations of their subscriptions. For the ninth year the same anonymous friend has given us £20 for the Illustrations Fund. You will remember that in 1943, at a moment of crisis, a member came to me with a donation of £50. Again in 1944 he made the same most generous donation. From a third anonymous source I have received ten guineas toward the cost of the forthcoming paper on the *Lithocolletis* moths. To Dr Kettlewell we are indebted for sharing with the Society the cost of the two coloured plates in the 1943-44 *Proceedings and Transactions*. This recital of widespread and generous support should fill us all with confidence.

I want to offer my personal thanks to all members for their continued kindness and helpfulness.

BALANCE SHEET.

Our investments are unchanged; their market value is very slightly up. Our cash resources are more than last year, reflecting the increase in the Special Funds. All these (Library, Publication and Illustrations) have been increased. Moreover, there appears as a new item in the Balance Sheet the Suspense Account of £10 10s 0d for the *Lithocolletis* paper.

INCOME AND EXPENDITURE ACCOUNT.

The subscription income was £141 15s 6d. This is some £12 more than last year and is due partly to increase in membership, but mainly to the collection of arrears. We must not expect a similar jump next year. The White Elephant Sale suggested by Mr Spreadbury produced £9 15s 6d. For the benefit of those who were not able to attend

I will explain that those who had surplus books, apparatus, etc., gave them to the Society for sale to members. The items on the expenditure side do not call for comment, except perhaps the increase in cost of insurance due to the Council having decided to augment the cover—see footnote to Balance Sheet.

CAPITAL ACCOUNT.

The income from Entrance Fees is again good, though not quite so good as in 1943.

LIBRARY FUND.

This has been strengthened and the closing balance is £21 15s 6d. The Librarian expects to have to meet heavy demands as soon as the war is over.

PUBLICATION FUND.

Both Donations at £68 10s 6d and Sales of *Proceedings* at £8 8s 1d show an increase. The cost of printing and posting *Proceedings and Transactions* is less than in 1943, owing partly to the economy effected by having one issue instead of two parts. The balance at the end of the year of £50 2s 0d represents the major part of the "build up" for the future to which the Council's report will refer.

ILLUSTRATIONS FUND.

Here is the second part of the "build up," for the balance at the end of the year is increased to £32 11s 3d. This has been achieved by adding to the £20 anonymous donation another £20 from Income and Expenditure Account. The Society's share of the cost of the two Coloured Plates was £25. The uncoloured plates cost £5 0s 2d.

Our thanks are due to Messrs S. W. C. Williams and R. M. Lang, A.C.A., for kindly auditing the accounts.

STATEMENT OF ACCOUNTS.

BALANCE SHEET at 31st December 1944.

[illegible]

Examined and found correct, 26th January 1945.

S. W. C. WILLIAMS.

R. M. LANG, A.C.A.

NOTE.—The Society's Books, Cabinets, Typical Collections, etc., are insured for £3000.

T. R. EAGLES, Hon. Treasurer.

INCOME AND EXPENDITURE ACCOUNT—Year to 31st December 1944.

Rent of Rooms ...	...	...	...	£50 0 0	...	Subscriptions (Arrears and Current) ...	...	£141 15 6
Insurance ...	...	...	...	3 5 3	...	Interest—	...	
Gratuities, Cleaning, etc. ...	...	...	...	2 0 0	...	£154 14s 0d 4% Consols	...	£6 3 8
Secretarial Expenses ...	...	...	...	20 5 5	...	£591 15s 3d 3½% Conversion Stock	...	20 14 2
Treasurer's Expenses ...	...	...	...	2 8 2	...	£100 3% Defence Bonds	...	3 0 0
					...	Deposit Interest	...	1 8 5
Subscriptions to South Eastern Union of Scientific Societies, Wicken Fen Fund, Footpaths Preservation Society, and Ramblers' Association	...	...	...	3 4 6	...	Less Income Tax	...	£31 6 3
Refreshments ...	...	...	...	3 3 3	...		...	15 14 3
Wreath ...	...	...	...	1 7 6	...	Hire of Slides	...	0 5 0
Grant to Publication Fund ...	...	...	...	45 0 0	...	White Elephant Sale	...	9 15 6
Grant to Illustrations Fund ...	...	...	...	20 0 0	...		...
Grant to Library Fund ...	...	...	...	14 0 0	...		...
Balance being excess of Income over Expenditure carried to Balance Sheet	...	...	...	2 16 2	...		...
					...		...	£167 10 3

CAPITAL ACCOUNT—Year to 31st December 1944.

Transfer to Library Fund ...	...	...	...	£2 5 0	...	Balance at 1st January 1944	...	£1084 5 11
Balance at 31st December 1944 ...	...	...	...	1084 5 11	...	Entrance Fees	...	2 5 0
					...		...	£1086 10 11

LIBRARY FUND—Year to 31st December 1944.

Purchases	...	...	...	...	£5 5 0	Balance at 1st January 1944	...	...	...	£13 16 1
Binding	...	...	...	...	3 0 7	Entrance Fees	...	...	...	2 5 0
Balance at 31st December 1944	...	...	...	...	21 15 6	Grant from Income and Expenditure Account	...	...	...	14 0 0
						£30 1 1				

PUBLICATION FUND—Year to 31st December 1944.

Printing and Posting <i>Proceedings and Transactions</i>	...	...	...	...	£79 6 11	Balance at 1st January 1944	...	...	...	£2 5 4
Balance at 31st December 1944	...	...	...	...	50 2 0	Sales of Proceedings	...	...	...	8 8 1
						Donations	...	...	...	68 10 6
						Interest on 3½% War Stock (Misses E. F. and L. M. Chapman)	£10 10s, less Income Tax	£5 5s	...	5 5 0
						Grant from Income and Expenditure Account	45 0 0
						£129 8 11				

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ILLUSTRATIONS FUND—Year to 31st December 1944.

Blocks and Printing—						Balance at 1st January 1944	£22 11 5
Part cost of Coloured Plates	...	...	...	...	£25 0 0	Grant from Income and Expenditure Account	...	...	...	20 0 0
Cost of Other Plates	...	...	...	...	5 0 2	Anonymous Donation	...	...	...	20 0 0
Balance at 31st December 1944	...	...	...	...	32 11 3					
						£62 11 5				

WORKERS AND SUBJECTS.

A first list of Workers and Subjects as mentioned in the Council's 1944 Report follows. As therein explained, the object of publication is to focus the work of all members, so as to achieve much greater results than can be reached by single members working independently. Any member doing work on, having unrecorded information concerning, or knowing of out-of-the-way records relating to, the species or subject mentioned should communicate with the key worker.

Key Worker.	Order.	Subject.
S. R. Bowden, 33 South View, Letchworth, Herts.	Lep.	Burnets of North Hertfordshire.
S. C. Scarsdale Brown, 142 Richmond Park Road, Bournemouth, Hants.	Micro-Lep	The genus <i>Gracilaria</i> , Haw.
F. D. Coote, 32 Wickham Avenue, Cheam, Surrey.	All	Fauna and Flora of Ashtead Wood and Common.
N. T. Easton, 25 Lambolle Road, London, N.W.3.	Lep.	<i>Panaxia dominula</i> , L.
L. T. Ford	Micro-Lep.	Food plants of all species.
Dr H. B. D. Kettlewell, Homefield, The Avenue, Cranleigh, Surrey.	Lep.	<i>Arctia caja</i> , L. <i>Arctia villica</i> , L. <i>Panaxia dominula</i> , L.
P. Siviter Smith, c/o 66 Stirling Road, Edgbaston, Birmingham, 16.	Lep.	<i>Lycaena phlaeas</i> , L., primarily, and the genus <i>Lycaena</i> (<i>Chrysophanus</i>) (Coppers) more generally.
J. Antony Thompson, Bishopswood, Prestatyn.	Lep.	<i>Pieris napi</i> .

SIDNEY R. ASHBY, F.R.E.S.

1864-1944.

By C. MacKECHNIE JARVIS, F.L.S.

The passing of our dearly esteemed curator at his house at Harrow on 18th September 1944, within a few days of a severe heart attack, took from us one of the oldest members of this Society and severed a link with 19th century entomology.

Sidney Robert Ashby was born in Paddington, London, in May 1864, and from his early years exhibited that undoubted trait of the born collector, the desire to seek out and assemble, whether the medium be specimens or data. Living in London he had, as a boy, little opportunity to collect from nature and so contented himself with such things as minerals and shells, although the London museums which he frequented provided him with more than an ordinary knowledge of natural history.

After a few years in a solicitor's office he entered the service of the Post Office Telegraph Department in 1883 and about the same period developed a taste for long-distance cycling, which during the succeeding decade took him as far afield as Ben Nevis and the Isle of Bute. Ashby had not been long in the Post Office before joining, as a Volunteer, a Signal Coy. of the Royal Engineers, then formed largely of G.P.O. men. One of his treasured possessions was a box of old photographs which he discussed with the writer a few weeks before his death. We debated the performance of the "Helios" of his days and the modern radio equipment issued to the Home Guard, and laughed at the young Ashby perched on top of a horse-drawn signal waggon!

In 1880, at the age of 16, S.R.A. decided to commence collecting British insects, and in a diary ruled in a manner which displayed considerable foresight and some knowledge of the Orders, recorded his first capture, the Lepidopteron, *Orthosia stabilis*, View. In subsequent years, Lepidoptera and Coleoptera were recorded in steadily increasing numbers, but it was not until after his encounter with W. West in 1894 that entomology received his undivided attention.

It is impossible to review S. R. Ashby's activities without reference to "my old friend West," a founder member and curator of this Society from 1872 to 1920. William West of Greenwich (not to be confused with W. West, L.D.S., his contemporary) was born at Rotherhithe in 1836. His entomological activities began in S.E. London in the early "fifties" and the first of his records we have relate to coleoptera taken in 1856. None can fail to regard with admiration and respect his attainments as a field entomologist. His memorial is surely the volume *Woolwich Surveys* (South Eastern Union of Scientific Societies, 1909) containing his lists of the Hemiptera, Coleoptera and Lepidoptera known to him from that district. We must remember, too, his interesting paper on "Lepidoptera of S.E. London" (*Entom. Record*, 1906, page 140 et seq.) in

which he draws upon his collecting experiences during more than 50 years. He died at Harringay on 20th July 1920 and was buried in Greenwich Cemetery, Shooters Hill, in the midst of what had been his collecting grounds.

Sidney Ashby was elected a member of this Society in 1895 and for many years prior to West's decease had assisted in the development of the Society's reference collections, thus becoming his natural successor.

During Ashby's tenure the collections have been expanded considerably, largely as a result of the Ashdown and Lister bequests, and probably few of his friends realise just how much of his time his charges claimed.

Retirement from the Post Office in 1924 enabled him to devote all his energies to the cause of entomology, and for the "South London" he worked unstintingly.

Ashby was primarily a Coleopterist and studied the British Fauna throughout his 64 active collecting years. In earlier days, from 1880 to about 1910, he took Lepidoptera also and built up a representative collection, but found that the time required for attending to his breeding cages prejudiced the study of other orders. Preferring to break new ground, he took up the study of Hemiptera under the expert guidance of West, and at the same time paid attention in the field to several of the lesser known orders as well.

In addition to his extensive British collections, he amassed some 150 store boxes of foreign Lepidoptera, Coleoptera and "Other Orders," all of which he carefully arranged and for the most part named. Perhaps it was his early training in the solicitor's office which caused him to develop his elaborate system of colour coding and indexing by which his specimens were recorded. The card index relating to his favourite Order, British Coleoptera, is particularly comprehensive, and gives full details of capture and references to the relevant literature. The following résumé should assist future workers in locating certain groups of the West and Ashby collections:—

W. West Collection of British Coleoptera contained in its original 36-drawer cabinet constructed by W.W. Many of the insects were collected in S.E. London on grounds long since built upon. This passes into the possession of Mr T. Barnett of Selsdon, an old friend of W.W. and S.R.A.

W. West British Hemiptera-Heteroptera, also Ashby-West British Hymenoptera and Diptera. In all some 36 boxes have been acquired by our librarian, Mr E. E. Syms.

Ashby British Coleoptera and Lepidoptera contained in two 40-drawer Brady cabinets, also Ashby British Hemiptera and miscellaneous "other Orders" with the relevant card-indexes, and unworked material together with a selection of the foreign Coleoptera, will be retained by the present writer.

Foreign Lepidoptera and Coleoptera, etc., contained in some 120 store boxes will be dispersed.

Note:—W. West British Hemiptera-Homoptera, some 3500 specimens, were presented to the British Museum in November 1919 by the collector.

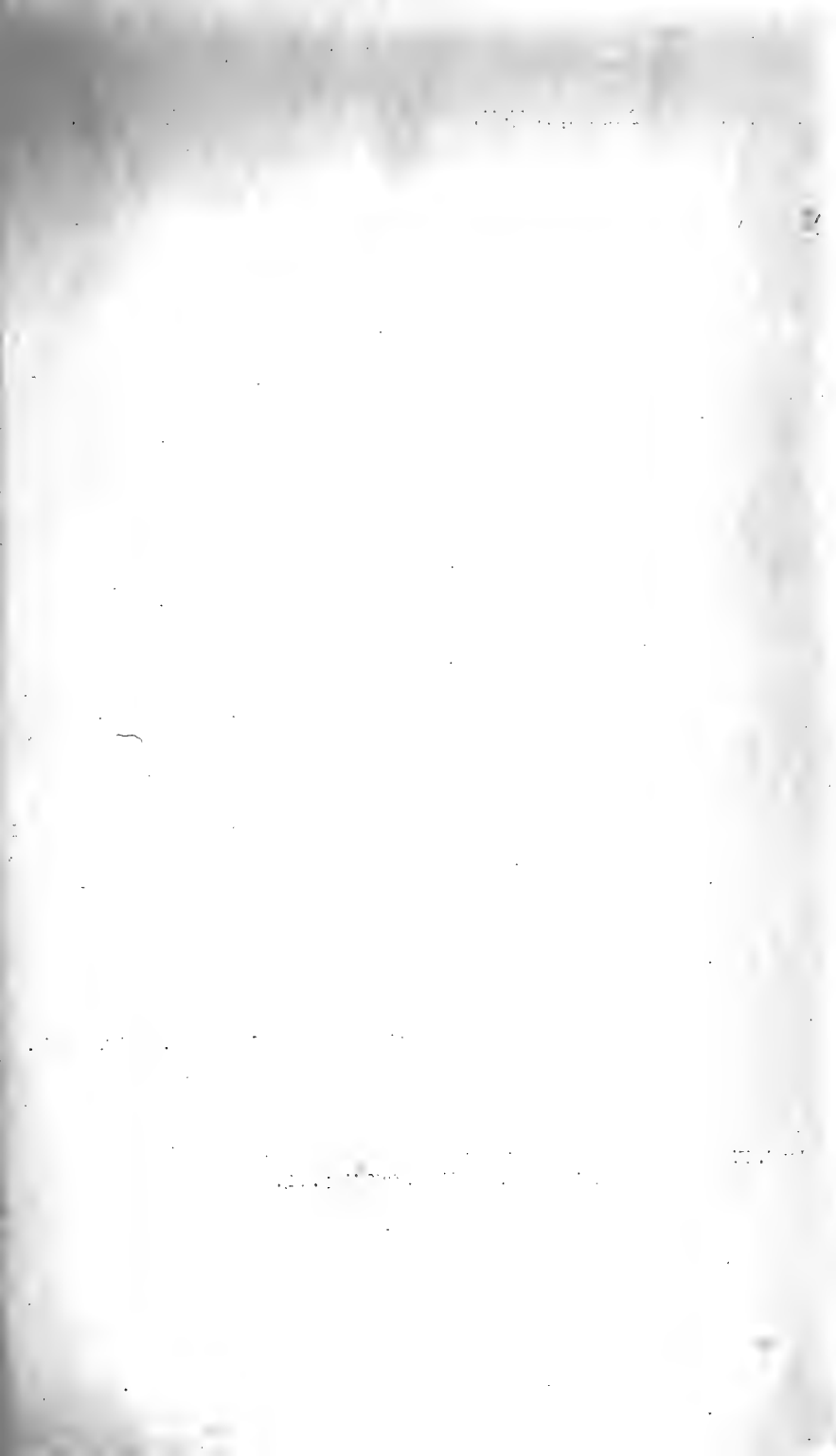
Having always lived in the London district with access to good libraries, Ashby kept few books. He was undoubtedly a field entomologist at heart and felt no urge to write for publication, although in earlier years he had corresponded widely with entomologists interested in Coleoptera and Hemiptera.

Methodical to an extraordinary degree, his passion for cataloguing everything connected with insects (and much besides) is reflected in the contents of some fifty loose leaf binders. Correspondence which he had preserved for years in neatly docketed bundles, was available for instant reference, and the contents reveal some interesting entomological problems of 40 years ago.

Ashby's circle of acquaintances was widened by his election to the (Royal) Entomological Society of London in 1907 and he was seldom avoidably absent from a meeting. In 1944 he was appointed to the Council of that Society, which office he held at the time of his death. For years he was a familiar figure at the annual "Verrall Suppers" of the Entomological Club and looked forward to this reunion with distant friends.

The writer well remembers his introduction to our late curator in 1924 through the medium of that delightful old-world personality, the late Stanley Edwards, F.L.S., F.Z.S., then General Secretary of this Society. Ashby was, as usual, presiding over his beloved cabinets in the Board Room at Hibernia Chambers, for so many years our home, and his portly figure was, even then, crowned with white hair and of course adorned with those characteristic moustaches! There was something very warm about the welcome he extended to all newcomers, and by his smile and ever approachable manner he won the regard of many. The "South London" has been referred to as "that excellent training ground for young entomologists," and surely no higher tribute could be paid.

In bringing this memoir to a close, it is the wish of the writer to acknowledge his own debt of gratitude to one under whose tutelage he embarked upon a study of British Coleoptera and from whom he received much generous encouragement.



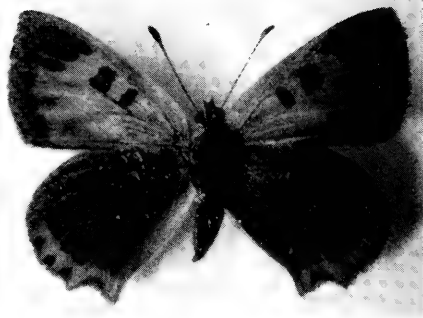
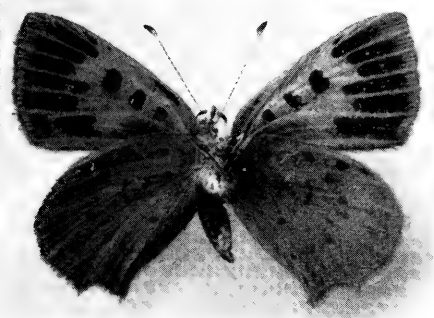


Photo. and blocks lent by P. Striter Smith.

HEODES (LYCAENA) PHLAEAS L.

Natural size and $\times 2$.

A very fine aberration taken on a Thistle head at Lulworth Cove in August 1939 by J. Fincham Turner, and exhibited by him at our meeting on 11th December 1943 (see *Proceedings*, 1943-44, p. 24).

ABSTRACT OF PROCEEDINGS.

INDOOR MEETINGS.

12th FEBRUARY 1944.

The President, Mr STANLEY N. A. JACOBS, in the Chair.

It was announced that the Society had received a second gift of £50 to the Publication Fund from the same anonymous donor as last year, and a gift of £10 10s 0d from another anonymous donor, the latter sum a contribution to the cost of Mr Jacobs' paper on the *Lithocolletis* species when ready; also the promise of another gift of £20 to the Illustrations Fund by the same anonymous donor who has been giving that sum year after year. A very hearty votes of thanks to these exceedingly generous donors was moved from the Chair and carried by acclamation.

Mr C. N. HAWKINS, on behalf of Mr R. J. COLLINS, exhibited the following 10 varieties of British Geometridae which the latter was presenting to the Society's collections:—*Cosymbia annulata*, Schulze, ab. *biobsoleta*, Riding; *C. pendularia*, Clerck, ab. *decoraria*, Newm.; *C. pendularia*, ab. *subroseata*, Woodf.; *Sterrrha muricata*, Hufn., ab. *totarubra*, Lamb.; *Eupithecia nanata*, Hb., ab. *mediofaciata*, Dietze (*nigrofasciata*, Dietze); *Xanthorhoe fluctuata*, L., ab.; and *X. montanata*, Schiff., 4 abs. from Orkney, Shetland, and Eire.

The Rev. Canon EDWARDS exhibited, in connection with his paper subsequently read, two preserved full-grown larvae of the Pine Processionary Moth, *Thaumetopoea pinivora*, Treit., and drew attention to the eversible red tubercles with urticating hairs.

Mr S. WAKELY exhibited four specimens, sent to him by one of our members, Mr S. C. Scarsdale Brown of Bournemouth, of *Plutella incarnatella*, Steudel, and read the following note:—"This species was placed on the British list on the strength of one specimen taken by Dr Jenkinson at Elgin in 1913. Mr P. Harwood, of Aviemore, Inverness-shire, has rediscovered this extremely local moth occurring in some numbers near his home. The species may be beaten out of Pine, Juniper, etc., from September to December, but the foodplant of the larvae is still a mystery. It is reputed to feed on *Sisymbrium austriacum* and *S. alliaria*. The well-known *Plutella maculipennis*, Curtis, is an allied species.

Mr S. R. ASHBY exhibited two Central American Theclids, *Thecla tuneta*, Hew., and *T. regalis*, Cram.

The Rev. Canon EDWARDS then read his interesting paper on "Gregarious Larvae" (see *Trans.*) and showed lantern slides in illustration of his remarks. After some discussion and questions, to which Canon Edwards replied, a very hearty vote of thanks was moved from the Chair and carried by acclamation.

11th MARCH 1944.

The PRESIDENT in the Chair.

The death in December last of Mr W. Buckley of 5 Westfield Road, Cheadle Hulme, Cheshire, was announced.

Messrs Stanley B. Hodgson, of 5 Charles Street, Berkhamsted, Herts., and Herbert Ramon Yglesias, of 55 Rusholme Road, Putney Hill, S.W.15, and 4 College Hill, London, E.C.4, were declared elected Members.

The PRESIDENT exhibited several living specimens of the Ptinid beetle, *Trigonogenius globulus*, Sol., from the Victoria Docks, and said it was a recent introduction, feeding on both vegetable and insect refuse in warehouses.

Mr S. WAKELY exhibited specimens of *Scardia boleti*, Fabr., from Betchworth, Surrey, and *Parascotia fuliginaria*, L., from Berkshire, two species with fungivorous larvae; also a piece of the fungus from which the former were bred, and hibernating larvae of the latter.

Letters were read from Bdr. W. H. JAMES, R.A., with the M.E.F., and from Mr H. E. HAMMOND, of Birmingham, the latter drawing attention to a beetle, *Aleochara bilineata*, Gyll., which is reported to devour both larvae and pupae of the Cabbage-root fly (*Chortophila*) and said that full details were published in the *Journal of Econ. Biology*, Vol. 10, 1-27, 2 pl., 1915, and a résumé in *Ent. Mo. Mag.*, 1916, pp. 161-3.

Mr W. H. SPREADBURY then gave a most interesting talk on "Mushrooms and Toadstools" (see *Trans.*) profusely illustrated with very fine lantern slides. After some discussion and questions, to which Mr Spreadbury replied, a very hearty vote of thanks was moved from the Chair and carried by acclamation.

8th APRIL 1944.

The PRESIDENT in the Chair.

Messrs Sydney Roskrige Bowden, A.R.C.S., B.Sc., A.I.C., of 33 South View, Letchworth, Herts.; Kenneth Maurice Pitfield Perry, of 21 Cornwall Road, Cheam, Surrey, and Charles Wainwright, B.Sc., F.I.C., of 216 St Bernards Road, Olton, Warwickshire, were declared elected Members.

Mr H. W. ANDREWS exhibited 5 bred specimens of *Chilosia albipila*, Mg. (Dipt. Syrphidae), also specimens of *C. grossa*, Mg., *C. chrysocoma*, Mg., and *C. illustrata*, Harr. He also showed living larvae and pupae of *Oxyna parietina*, L. (Dipt. Trypetidae), in stems of *Artemisia vulgaris*, L.

Mr S. WAKELY exhibited larval mines of *Nepticula suberivora*, Staint., in leaves of *Quercus ilex* (Evergreen Oak) sent to him by Mr S. C. Scarsdale Brown of Bournemouth. Attention was drawn to the cocoons, which were spun up in the paper wrapped round the leaves. Imagines bred in previous years were also shown.

Mr C. N. HAWKINS exhibited an almost perfect male specimen of *Acherontia atropos*, L., found dead in a road at Leytonstone, London, E.,

by a Mr Arthur Dungey, on 22nd October 1943, after an air raid; and mentioned that the specimen was still soft and able to be set without relaxing when it was given to him on 26th October.

Dr K. G. BLAIR exhibited the larvae of two species of Sawflies (Fam. Cephidae), viz.—1, *Hartigia linearis*, Schrk., in dead stems of Agrimony, *Agrimonia eupatoria*, L., from Bookham Common, sent by Mr H. J. Burkhill. The larvae moved up and down in the long semi-transparent cocoons; one of them had repaired the cocoon from which it had been extracted for determination. 2, *Janus femoratus*, Curt., in galls formed as thickenings in Oak twigs on Wimbledon Common. One of the galls showed the characteristic cap of dead twig at the tip of the gall. The swelling was mainly of living tissue with the larval cavity at the apex, but in both cases exhibited this was occupied by the cocoon of an Ichneumonid parasite, presumably *Pimpla inanis*, Schrk. The shrivelled empty skin of the host larva was plastered on the outside of the cocoon. He also showed pieces of dead Oak branches with larval burrows of the Eucnemid Coleopteron, *Melasis buprestoides*, L., from Wimbledon Common.

Mr SPARROW exhibited a larva of *Aegeria vespiformis*, L., on Oak, from Ashtead; imago of *Coleophora paripennella*, Zell., from Bramble at Ashtead last year; and larva of *Eucosma pflugiana*, Haw., in Thistle stems from Scratch Wood.

Mr T. R. EAGLES exhibited a few larvae of common British Lepidoptera.

Mr HY. J. TURNER reported that larvae of *Macrothylacia rubi*, L., were now appearing after hibernation and preparing to spin up.

11th MAY 1944.

A Vice-President, Capt. R. A. JACKSON, R.N., and subsequently the PRESIDENT, in the Chair.

It was announced that Mr J. F. Johnstone, F.R.E.S., of Southsea, a member since 1923, died early in February last.

It was also announced that Mr C. Rippon had presented to the Society a new opaque screen for the lantern. A very hearty vote of thanks was moved from the Chair and carried by acclamation.

Mr George Sidney Kloet, F.Z.S., F.R.E.S., of "Vanessa," 8 Knutsford Road, Wilmslow, Cheshire, was declared elected a Member.

Mr H. W. ANDREWS exhibited specimens of a number of species of British Diptera which he subsequently presented to the Society's collections and for which a very hearty vote of thanks was recorded.

Capt. R. A. JACKSON exhibited young larvae of the moth *Poecilopsis lapponaria*, Bdv., 18 days old, feeding on Birch, and bred from ova laid by females obtained at Struan in April.

Mr T. R. EAGLES exhibited branches of a Chinese rose, *Rosa omeiensis*, Rolfe, var. *pteracantha*, (Franch) Rehd., and called attention to the curious winged thorns.

Mr M. NIBLETT exhibited a piece of very hard, blackish substance found in the heart of a large Beech tree. It was considered too light to be metallic and it was suggested it might be some form of carbon produced in the tree by lightening.

Mr L. G. PAYNE exhibited two queens of the Hornet, *Vespa crabro*, L., which were taken on April 16th in the pine woods between Virginia Water and Sunningdale. The exact site was in the frass of a hollow Birch tree which had cracked at the base and fallen. The tree measured 45 feet in length with a basal girth of 42 inches. The interior hollow extended for at least 7 feet and it is possible that in life the tree had been used as a nesting site by Hornets. The Hornets exhibited were under about 6 inches of frass and 2 feet from the base of the tree.

Mr E. E. SYMS exhibited nests of various Bees formed in some of the special observation cages he had put out in his garden.

Mr H. LAST exhibited specimens of *Cossonus parallelepipedus*, Hbst., taken from the condemned Elms in Windsor Park as larvae and pupae in September 1943. They were only to be found right inside the trunk where the wood was soft and decayed.

Mr W. O. STEEL exhibited the Saw Fly, *Trichiosoma lucorum*, L., found at Welwyn Garden City on 29.iv.1944, which he thought to be a very early date.

Mr J. A. STEPHENS exhibited a card cutting apparatus for making mounts for Coleoptera.

Mr C. N. HAWKINS exhibited further examples of abnormal growth of the *Salix atrocinerea*, Brot., from his garden at Wimbledon and referred to the previous example which he showed on 9th September last. He stated that these further specimens had enabled Mr Laing of the British Museum (Natural History) to identify the cause as the Mite, *Phytoptus (Eriophyes) triradiatus*, Nalepa.

8th JUNE 1944.

The PRESIDENT in the Chair.

The recent death of Mr H. Wood of "Albert Villa," Kennington, near Ashford, Kent, a member since 1918, was announced.

Mr John Forsyth Johnstone, of Courtlands Hotel, Clarence Parade, Southsea, Hants, was declared elected a Member.

Mr M. NIBLETT exhibited some South African galls in connection with his paper subsequently read.

Mr HY. J. TURNER exhibited examples of *Panthera unciaria*, Guen., from Sao Paulo, Brazil, taken in August, and another specimen (? same species) from the same place in February.

Dr K. G. BLAIR exhibited an Ichneumon-fly, *Otenichneumon castigator*, Fab., reared from a pupa of the Lepidopteron *Gortyna flavago*, Schiff., found in a dead Thistle stem at Ashted on 20th April last. The parasite emerged on 5th June. The empty pupa-shell was choked with the hairs and scales of the moth, which had been practically ready

to emerge when it succumbed to the ravages of the parasite, presumably last August or September. He also showed full-grown living larvae of the Stag Beetle, *Lucanus cervus*, L., from the stump of a young Sycamore tree in his garden at Wimbledon which was cut down about five years ago. As the adult beetles had then been about for a week or two it was considered doubtful whether these would produce beetles this summer. Adult beetles were, however, seen to emerge from beneath the same stump a few days later, while second stage larvae were also found, which suggests that broods of three years were present.

Mr W. H. SPREADBURY exhibited a specimen of the Blood-veined Dock, *Rumex sanguineus*, L., grown in a garden where the plant seeds freely and springs up self-sown every year. The original seedling came from a Sussex wood, and it was suggested at the time that the plant was probably not the true *R. sanguineus*. However, the specimen shown is the fifth generation and the plants come true every year. There is no indication of hybridisation in spite of the near presence of wild specimens of *R. viridis*, Sibth. (a similar plant but with green veins) and *R. obtusifolius*, L. He also exhibited galls in Common Reed and said that the gall is in the arrested shoot and is caused by the fly, *Lipara lucens*, Meig., of which one specimen, which emerged on 6.vi.1944, was shown, together with specimens of its Hymenopterous parasite, *Pteromalus liparae*, Gir.

Mr T. R. EAGLES exhibited larvae of *Lymantria monacha*, L.; *Pheosia gnoma*, Fabr., and *Orthosia miniosa*, Schiff. Also a pair of the beetle, *Prionus coriarius*, L. These are reported in the press to be damaging telegraph posts. Dr Blair remarked that he also had seen the report but doubted that the culprit responsible had been correctly identified. *Prionus* larva feeds on the large roots, mainly of Beech and Oak, though it has been reported from conifers, and it is not at all likely that it would oviposit on timber from which the bark had been removed, and even if it did the creosote would probably be fatal to the larvae. He recalled that in North Italy he had seen a line of telegraph posts heavily damaged by beetle borings and actually found adults of *Hylotrupes bajulus*, L., on the infected poles (which, however, had not been creosoted). This species is known in this country as a pest of roofing timbers of coniferous woods and may have been responsible for the damage to the telegraph posts in the present instance.

Mr E. E. SYMS exhibited photographs of the larvae and pupae of *Trichoptilus paludum*, Zell.

Mr E. J. SUMMERS exhibited a specimen of the rare beetle, *Necrophorus interruptus*, Steph., taken by him on the underside of a dead Starling in his garden on 27.vii.1943.

Capt. R. A. JACKSON, R.N., read the following interesting note on the recovery of an apparently moribund larva of *Apatura iris*, L.:—"The larva was beaten on May 25th, half grown, but apparently crippled, and unable to grip the leaves. My wife said it was about to change its skin, but it seemed flaccid, and I doubted it. This was at 5.30. At 7.30 I found that it had just changed, but with no silk pad it could not quite

clear its anal segments. Luckily I had caught it in the act. The old skin was still moist, and I was able to draw it off backwards, very gently, with a setting needle. I felt very pleased. At 8.30 all seemed well. At 9.30 I looked again, and found poor *iris* very weak, and apparently bleeding 'behind its ears.' At 10.0 it turned over on its side and lay as one dead, with no movement at all. Next morning it was just the same, quite lifeless, and I almost threw it away. At 5 p.m. it showed some signs of life, and was able to move its head, so I stood it up on its feet. At 7 p.m. it was just the same, but at 8 p.m. it started to crawl and was much better. At bedtime it had moved well up a Sallow stem, but did not eat, nor had it done so at 2 a.m. next morning. At 7 a.m., however, I was delighted to see some frass and that it had eaten half a leaf. Now it seems quite well, eats heartily and stands in no need of any laxative. Frohawk says that after moulting *iris* rests for 18 hours before feeding, but this was a case of a larva, apparently lifeless for 18 hours, and not feeding for 32 hours."

The PRESIDENT reported taking an example of *Aegeria chrysidiformis*, Esp., at Whitstable in Kent a few days ago.

Mr NIBLETT then read his interesting and instructive paper on "South African Galls" (see *Trans.*) and reviewed the present state of knowledge on the subject. A hearty vote of thanks was moved from the chair and carried by acclamation.

13th JULY 1944.

The PRESIDENT in the Chair.

The Rev. Canon T. G. EDWARDS exhibited two larvae of *Hemaris fuciformis*, L., from Ashted, one full-grown and one in first instar.

Mr R. J. BURTON exhibited a large cluster of Chrysopid eggs, and suggested that the dense arrangement of these long-stalked eggs might serve as a protection against predators.

Mr J. A. STEPHENS exhibited a number of rare and other species of Coleoptera taken in Cobham Park, etc., recently, including *Phymatodes testaceus*, L., beaten from Maple, 29.vi.1944; *Leptura livida*, F., beaten from flowering Chestnut tree, 13.vii.1944; *Athous villosus*, Geoff., taken out of rotten Hornbeam, 15.vi.1944 (rarely seen, though the larva is abundant); *Elater balteatus*, L., beaten from Oak, 6.vii.1944 (first record for district); *Tillus elongatus*, L., beaten from Ash, 6.vii.1944; *Abdera biflexuosa*, Ct., and *Conopalpus testaceus*, Ol., both beaten from Oak, 21.vi.1944; also *Ptinus sexpunctatus*, Pz., and other species from various localities.

Major FREMLIN exhibited an Ant Lion from East Africa, and an unnamed Hemipteron Homopteron from Ryarsh, Kent.

Mr T. R. EAGLES exhibited the green and brown forms of the larvae of *Cosymbia punctaria*, L.

The Secretary, Mr F. STANLEY-SMITH, on behalf of Dr G. V. BULL, then read the following series of notes, dated 10th July 1944, entitled

"Spring Notes from Sandhurst": "The first Sallow catkin in my garden showed on 25th February, and the first moth was beaten from the tree on 19th March. *Brephos parthenias*, L., was seen on the wing on 24th March. Moths were not abundant on the Sallows but all the common Taeniocampids appeared in small numbers except *Monima* (*Taeniocampa*) *populi*, Fb. (*populeti*, Hb.), which I have never taken in my immediate neighbourhood. *Euchloë cardamines*, L., was seen on 9th April; *Pieris rapae*, L., on 18th April, and *Lycaenopsis argiolus*, L., on 23rd April. *Argynnis euphrosyne*, L., appeared on 1st May, well before its average date. Both this insect and *A. selene*, Schiff., were less abundant than in 1943. The nights of June, with 3 or 4 exceptions, were all cold and most of the insects usually seen on my Valerian were absent. *Plusia gamma*, L., appeared on 4th June, and after that from one to three were present on odd nights. *Deilephila elpenor*, L., came on three or four occasions; *Leucania comma*, L., one only, though usually in some numbers. No *Triphaena pronuba*, L., *Agrotis exclamationis*, L., *Abrostola tripartita*, Hufn., *Plusia chrysites*, L., nor *P. iota*, L., were seen. The Oaks and young Chestnut and Ash trees, which were badly cut by the frost some eight weeks ago, seem to have recovered completely."

10th AUGUST 1944.

Capt. R. A. JACKSON, R.N., F.R.E.S., one of the Vice-Presidents, in the Chair.

Mr Dennis S. Burrows, of 33 Brookehowse Road, Bellingham, London, S.E.6, and Sgt. Theo. M. Telsch, 33593443, of H.Q. Command, H.Q. Det. Eng. Section, E.T.O.U.S.A., A.P.O. 887, c/o U.S. Army, were declared elected Members.

Mr F. D. COOTE exhibited an adult of the Hemipteron, *Ledra aurita*, Lin., taken at Ashted on 5th August.

Mr T. R. EAGLES exhibited sprays of Ivy buds with ova and young larvae of *Lycaenopsis argiolus*, L., a species which has been very abundant lately. He also showed larvae of *Tethea ocellaris*, Guen. (*octogesima*, Hb.).

Capt. JACKSON exhibited a defective pupa of *Apatura iris*, L., which resulted from the revived larva of which he gave an account on 8th June last; and reported that *Oria musculosa*, Hb., was extremely plentiful this year in the Salisbury district, where, when wheat was being cut on 4th August, the moths, mostly females rather worn, were flying out in all directions. One field where this occurred had lain fallow the previous year, and another had been under clover. He also reported that a number of varieties of *Lysandra coridon*, Poda, had been taken at Salisbury, and that he had seen one or two from St Catherine's Hill at Winchester, where varieties are usually rare. He mentioned that the late Dr Hodgson, in a paper read in 1909, drew the inference that a cold, dull summer led to increased variation, and Capt. Jackson suggested that, in

view of the condition prevailing since early June, a good year for varieties should be in prospect.

Col. P. A. CARDEW then gave a short account of some of his best captures, entitled "My Red-Letter Days," and Mr F. D. COOTE read a short paper on "Ashtead." A hearty vote of thanks to these two gentlemen was proposed from the Chair and carried by acclamation.

14th SEPTEMBER 1944.

The PRESIDENT in the Chair.

The PRESIDENT exhibited a cross-pairing of male *Hofmannophila* (*Borkhausenia*) *pseudospretella*, Staint., with female *Ephestia elutella*, Hb., from Central Granary, Millwall Dock.

Mr L. LAST exhibited two specimens of the locally common Heteromorous beetle, *Notoxus monocerus*, L., and said:—"This is the only species of the genus in England and is curious in having the anterior portion of the thorax extended over the head in a strong horn. Fowler says that in abnormal specimens this horn is divided and forked. I swept these at Bude on 13th May 1944." He also showed three specimens of *Laemostenus terricola*, Hbst., "another species said to be common and widely distributed. It is recorded as being found in a variety of situations, cellars, sandpits, under bark, stones, and leaves. I took these from a wood-pigeon's old nest quite 10 feet from the ground. As I broke up the nest over a sheet seven of these rather large beetles fell out and scampered away. I was not really prepared for such large inhabitants. The cyaneous colour of the elytra is rather attractive. These were taken at Bow, Devon, on 3rd July 1944."

Mr L. G. PAYNE exhibited the beetle *Chrysomela menthastris*, Suff., taken on Tansy between Milford and Godalming. He thought it was a new record for Surrey.

Mr EAGLES exhibited a number of larvae recently collected from Birches in Epping Forest, including *Notodonta dromedarius*, L.; also larvae of *Cosymbia linearis*, Hb., from Beech, showing the green form and the brown one; and a full-fed larva of *Cilix glaucata*, Scop.

Mr EAGLES then read, on behalf of the respective authors who were unable to be present, Mr Sparrow's paper "More Notes on Micro-lepidoptera" and extracts from Mr Leeds' paper, "Monks' Wood, Hunts., and its Environment, Past and Present" (for the latter, see *Trans.*).

14th OCTOBER 1944.

THE ANNUAL EXHIBITION—RECORD OF EXHIBITS.

The PRESIDENT opened the exhibition at 2.30 p.m. A brief description of the varieties, rarities, and other objects of interest shown by exhibitors follows. It is regretted that owing to demands on space it has proved impossible to publish full notes of all the interesting things shown.

Mr B. W. ADKIN.—Two aberrations of the Lepidopteron, *Argynnis selene*, Schiff., taken by himself near Tunbridge Wells, 24th June 1944, one with broad black bands on all wings.

Dr C. H. ANDREWES.—Five species of British Hemiptera-Heteroptera taken in 1943 and 1944 near Great Gaddesden and believed not to have been previously recorded for Hertfordshire: *Sehirus luctuosus*, Mul. & R., *Rhopalus subrufus*, Gmel., *Metatropis rufescens*, H.-S., *Trapezonotus arenarius*, L., *Pilophorus cinnamopterus*, Kirsch. Also five bugs taken in 1943 and 1944 around Hampstead, Finchley, and Edgware, and believed not to have been previously recorded for Middlesex: *Elasmotethus interstinctus*, L., *Mecomma ambulans*, Flin. (also a macropterous ♀ from Bushey, Herts., 23.vii.44), *Heterocordylus genistae*, Scop., *Hoplomachus thunbergi*, Flin., *Amblytylus affinis*, Fieb.

Mr H. W. ANDREWS.—A series of *Rhingia rostrata*, L., a scarce British Syrphid (Dip.).

Mr T. L. BARNETT.—Long and varied series of Lepidoptera: (a) *Spilosoma lutea*, Hufn. (*lubricipeda*, L., in part.), including ab. *zatima*, Stoll., from the late W. H. Tugwell collection; (b) *S. lubricipeda*, L., in part. (*menthastri*, Esp.), including spotless and heavily spotted forms, mostly from the Croydon district; (c) *Mimas tiliae*, L., mostly bred, from Croydon and Mitcham.

Capt. E. S. A. BAYNES.—The following Lepidoptera: (a) a series of *Panaxia dominula*, L., bred from an Oxford strain, showing the typical form, ab. *medio-nigra*, Cckne., including an asymmetrical example, and various forms of ab. *bimacula* Cckne.; (b) a series of *Bupalus piniaria*, L., bred from Surrey larvae including male and female ab. *funebis*, Cckne., and examples of a small pale form; (c) a yellow variety of *Phragmatobia fuliginosa*, L.; (d) a specimen of *Abraxas grossulariata*, L., in which the dark markings near the base of the forewings coalesce roughly into the form of a "figure of 8."

Mr E. J. BEDFORD.—Six water-colour drawings of British Orchids; photographs of the Convolvulus Hawk-moth (*Herse convolvuli*, L.), the Leopard Moth (*Zeuzera pyrina*, L.) and larva of the Alder Moth (*Apatele alni*, L.), all from living specimens.

Dr K. G. BLAIR.—Galls of *Lipara lucens*, Mg. (Diptera, Chloropidae), with the flies, parasites and inquilines reared from them.

Mr S. R. BOWDEN.—Lepidoptera: (a) *Maniola jurtina*, L., and *Aglais urticae*, L., taken in coitû, Aveley, Essex, 1.vii.43 (see *Ent.*, 76, 209, and 77, 72); (b) *Colias croceus*, Fourc., a brood from an ab. *helice*, Hb., female, showing a 4:3:1 ratio of males: *helice* females: *croceus* females. The peculiarity of this brood lay in the ratio 35 males: 26 *helice* females: 7 *croceus* females obtained in the bred (August-September) generation—practically 4:3:1. (Two insects were perhaps doubtfully classified as *helice*; if these were counted as *croceus* the ratio was 35:24:9, which was still close to 4:3:1). As *helice* (W) is dominant over normal *croceus* (w), this appears to be a case of the mating of two heterozygotes (Ww), with no linked lethal. A previous instance is recorded from

France by T. A. Chapman, *Ent.*, 38, 140 (1905). In the isolated *croceus* colony in a wheatfield at Willian, Herts., from which the female was taken in July 1943, many *helice* females were seen, but no normal *croceus* females. The colony was almost certainly the progeny of a single female, which chose in May-June a situation normally unattractive to the species, and it remained isolated for that reason. If there were in fact no normal *croceus* females in the colony in July, one of the May parents must have been (WW) (homozygous for *helice*); the other may have been (ww) or (Ww). If *croceus* occurred in the ratio of one to 3 *helice*, but was overlooked, both May parents were (Ww); only if *croceus* and *helice* females were in fact present in equal numbers in July can one of the May parents have been normally homozygous (ww).

(NOTE.—In this brood males and females are, as expected, approximately equal 35:33. If, as seems probable (but not certain since the proportion of *helice* and *croceus* in the males cannot be distinguished in these sex-limited cases and might in fact balance the uneven proportions in the females, so as to bring the proportions to the whole brood to 1:1) both parents were heterozygous for *helice* and *croceus*, then on the normal assumption that the two forms are evenly distributed between the sexes, the expectation would be, in the females, a proportion of 3 *helice* (of which 2 would be heterozygotes) to 1 *croceus*. If there were 7 *croceus* females, there should have been 21 *helice* only, but if there were in fact 9 *croceus* females there should have been 27 *helice*, which is practically what was obtained. See also *Proc. and Trans.*, 1942-43, Pt. II, pp. 46-48.—C. N. H.)

Mr A. A. W. BUCKSTONE.—Various Lepidoptera: (a) a gynandrous specimen of *Polygonia c-album*, L., bred from Ashted ova, June 1944; (b) a large series of *Aglais urticae*, L., bred from Ashted larvae, June 1944. Coloration varied from pink to dull red. All the darker specimens had the blue lunules reduced in size and in a few of the lighter forms the yellow patch on the costa between the second and third black spots of the forewings was united with the yellow spot on the inner margin, thus forming a band. A number approached *ab. polaris*, Stdgr. Undersides were extremely pale with whitish bands to hindwings; (c) another series of the same species bred from Ewell larvae, August 1944, in which the coloration and markings varied somewhat to the same extent as in the June bred series except that there was a smaller percentage of the paler forms. A few of the undersides, which were extremely dark, had the colour of the forewings a pale brown, the band of the hindwings a reddish-brown; (d) *Bupalus piniaria*, L., a long series bred from Oxshott larvae. The upper and undersides varied from white to almost black. Several females had narrow blackish bands on upper sides of forewings; (e) living pupae and imagines of possible third brood of *A. urticae* taken as larvae, 6th September, in North Devon. Imagines commenced to emerge 8th October, pupae having been kept in a warm room. All these imagines were undersized and had extremely pale ground colour, while the blue lunules were much reduced in size. To date about one

hundred butterflies had emerged; (f) living larvae of *B. piniaria* from Oxshott, Surrey; (g) a short series of *Lysandra coridon*, Poda, "semi-obsolete," Surrey Hills, August 1944.

Dr G. V. BULL.—Lepidoptera including *Lymantria* (*Psilura*) *monacha*, L., from Herts, Kent, and Sussex, compared with bred specimens from the New Forest, and two *Lycaena phlaeas*, L., with the border of the hindwings radiated.

Mr BRUCE BURNS.—Lepidoptera: (a) a male *Pontia daplidice*, L., Gosport, 14th July 1944, a very rare immigrant; (b) *Colias croceus*, Fourc., ab. *pallida*, Tutt, Alverstoke, June 1943; (c) *Argynnis paphia*, L., ab. *valesina*, Esp., New Forest, July 1944; (d) two male *Hyloicus pinastri*, L., captured at rest at the same time on the trunk of a Himalayan Deodar at Eastleigh, 1st July 1942, apparently newly emerged.

Col. P. A. CARDEW.—Lepidoptera: *Sterrhia muricata*, Hufn. (*auroraria*, Bkh.) and *Scopula* (*Acidalia*) *rubiginata*, Hufn., a short series of each from various localities to show extremes of variation.

Dr E. A. COCKAYNE.—Lepidoptera: *Ortholitha scotica*, Cckne., including normal, dark, and intermediate forms, and Scottish forms of *Crocallis elinguaris*, L.

Mr B. A. COOPER.—A number of Lepidoptera, etc., including (a) an asymmetrical aberration of *Papilio machaon*, L., with one of the yellow outer rows of forewing spots replaced by black, bred 1939, from Norfolk Broads; (b) two specimens of *Apatele* (*Acronicta*) *auricoma*, Schiff., reared in 1939 from larvae taken in the New Forest; (c) an unusual aberration of a Geometrid, believed to be of *Xanthorhoe montanata*, Schiff., at present undescribed, taken in Leeds, May 1941; (d) long series of *Hemerophila abruptaria*, Thnbg., reared by the exhibitor and Mr J. E. Knight. One series was of a form showing a narrow central forewing band, found in both the light and the melanic types, but showing no intermediates with the typical form. The other series was of a completely suffused form, appearing as about 30% of the narrow-banded-form progeny. Unfortunately the stock was lost in 1941 owing to war-time causes after having been reared in numbers for three years. Both sexes occurred in both forms; (e) photographic enlargements of living Lepidoptera from the negatives of the late Mr A. E. Tonge; (f) photographs and paintings of living larvae and adult American silkmoths reared in 1944; (g) other insects as described on page 24, 1943-44 *Proc. and Trans.*

Mr J. C. B. CRASKE and Capt. R. M. CRASKE.—Aberrations of Lepidoptera taken in 1944, including (a) *Argynnis euphrosyne*, L., from Surrey, 2 males and 1 female with cream ground colour, and 1 female banded on fore and hindwings; (b) *A. selene*, Schiff., from Surrey, an extreme variation of the male with the marginal spots on all wings extended into radiate streaks, the central area almost devoid of markings and the underside rayed pearly-white; another, an extreme form of the male with the marginal spots on the forewings extended into streaks, two-thirds of the hindwings covered with black suffusion, and the underside rayed pearly-white; and a third, less extreme; (c) *Melitaea athalia*, Rott.,

from Devonshire, one a female with forewings heavily suffused with black scales, and smoky hindwings, another, a male with the basal area of the forewings devoid of markings and the hindwings heavily suffused with black scales, a form approaching var. *eos*, Haw., and other banded forms; (d) *Lysandra coridon*, Poda, from Surrey and Wilts., including ab. *syngrapha*, Kef., a female underside *alba*, Tutt, a female *albescens*, Tutt, a female *transformis*, B. & L., males of slate colour, underside of ab. *obsoleta*, Tutt, and forms with tendency to white ground; (e) *Lycaenopsis argiolus*, L., including a female with underside "*ultra-radiata*," probably unique, and a gynandromorph, left side female, right side male, both taken 27th July 1944, in Surrey, also examples of "*antico-obsoleta*"; (f) *Lycaena phlaeas* from Surrey, including an extreme ab. *bipunctata*, Tutt, of which the underside forewings also are almost devoid of spots, 3 males and 3 females ab. *obliterata*, Tutt, 3 extreme forms of ab. *intermedia*, Tutt, and 2 underside aberrations similar in form to ab. *discreta*, Tutt, of *L. coridon*, with a tendency to radiation from the margins; (g) *Aglais urticae*, L., including a male with the two small central spots absent, and a male and a female showing colour variation, captured in Devon in September, and 4 examples of ab. *polaris*, Stdgr., bred Surrey in July; (h) *Maniola jurtina*, L., from Surrey, including a male with pale buff ground, also 1 male, and 2 females symmetrically rayed with white on all wings; (i) *Aricia agestis*, Schiff., from Wilts. and Surrey, including a male underside with strong tendency to radiation, a female underside showing white ground colour, a female underside "*semi-obsoleta*" on dark ground, and a male upperside extreme form ab. *allous*, Hb.

Mr A. W. DENNIS—Stereoscopic photographs of sundry insects.

Mr E. A. J. DUFFY.—Some interesting Coleoptera and their larvae from the Surrey-Hants border.

Mr T. R. EAGLES.—A selection of autumn fungi, and a larva of the Lepidopteron, *Laspeyria flexula*, Schiff.

Mr N. T. EASTON.—Aberrations of Lepidoptera taken and bred mainly in 1944, including: *Aphantopus hyperantus*, L., ab. *arete*, Mill., and ab. *caeca*, Fuchs, both taken near Droitwich. *Maniola jurtina*, L., a partial albino, l.f.w. affected, taken near Gloucester in 1943. *Euchloë cardamines*, L., a mixed gynandromorph. Upperside showed female markings, whilst underside had irregular and asymmetrical areas of the male orange colouring in the apical area. Genitalia mixed, those of both sexes being present, though predominantly female. Taken at Droitwich. *Argynnis euphrosyne*, L., a female having melanic hindwings, with radiate margins, forewings being almost typical. Taken near Droitwich. *A. paphia*, L., ab. *confluens*, Splr. Confluence of marginal spots limited to hindwings only, and an aberration showing confluence of the forewing marginal row of spots, with a general obsolescence of markings at the basal end of the inner margin of the forewings. The hindwings showed obsolescence of the "zigzag" streak distal to the discoidal, with almost complete absence of the usual outer angle marginal spots between veins

6 and 7. The remainder of the outer row of marginal spots on the hindwings were replaced by four "comet-like" streaks. An unusual form. Both taken near Droitwich. *Pieris napi*, L., ab. *magno-maculata*, Müll., a female, taken near Aberdeen. *Panaxia dominula*, L., a selection of bred aberrations, including: 2 ab. *medio-nigra*, Cckne.; 2 ab. *bimacula*, Cckne.; 4 of a form with "pin-point" basal spots; 1 form having "pin-point" upper basal and horizontally streaked lower basal; 1 new form having no basals, with double costal streak on hindwings, probably the homozygous expression of the form with "pin-point" basal spots above; 2 ab. *bimacula*, an extreme form having normal forewing background colour replaced by blue-black; 2 ab. *bimacula*, having all remaining forewing spots deep orange, with banded hindwings; probably a new form; 2 ab. *medio-nigra*, with sub-normal basal spots on forewings; 2 ab. *medio-nigra*, with double costal streak on hindwings; 1 a form having spiral scaling on r.f.w. only, causing blurring of the sub-apical, apical and inner marginal groups of spots on forewings. This insect had an abnormally wide black dorsal stripe, similar to that figured in Dr Kettlewell's plate II, fig. 7 (*Proc. S.L.E. and N.H.S.*, 1942-43); 2 ab. *crocea*, Schultz; 1 ab. *ocellata*, Ktlwl.; 3 of a form with heavily-marked forewings and dull orange hindwings, lightly marked; 1 ab. *illustris*, Ktlwl., having blue-black, heavily marked forewings and lightly marked pink hindwings; and several others.

Canon T. G. EDWARDS.—Lepidoptera: (a) (i) bred in 1944, including *Gastropacha quercifolia*, L., 3 females and 1 male from Bexley larvae, *Eilema deplana*, Esp., from Box Hill, *Aegeria vespiformis*, L., a female from Ashtead (also a male taken in flight), *Saturnia pavonia*, L. (*carpini*, Schiff.), from larva on bramble in Ashtead Woods, *Sphinx ligustri*, L., from Devon, *Perizoma bifasciata*, Haw., ab. *unifasciata*, Haw., from Camberley larvae, and *Parascotia fuliginaria*, L.; (ii) captured in 1944, including *Lysandra coridon*, Poda, ab. *semi-syngrapha*, Tutt, from Ranmore Common, *Procris statice*, L., from Ashtead Woods, and *Setina irrorella*, L., from Ranmore Common. (b) taken in Ceylon by his brother-in-law, the late Canon L. J. Gaster, representing local races with distinguishing features peculiar to the island forms, including *Papilio polymnestor*, Cr., race *parinda*, Mr., *P. sarpedon*, L., race *teredon*, Fldr. (note the scent scales); *P. eurypylus*, L., race *jason*, Esp.; *Appias narendra*, M., male and female, rare and very local. Prior to this capture, the female was unknown. Three specimens were taken. One is now in the national collection at the British Museum, the other is in the keeping of a private collector in Ceylon. *A. libythea*, Fb.; *A. paulina*, Cr.; *Huphina cingala*, Mr. (known as "the green back"); *H. nerissa*, Fb.; *Ixias cingalensis*, Mr.; *Pavonia ceylanica*, Fldr.; and *Atella ceylonica*, Mand., a very local insect.

Mr BERNARD EMBRY.—Examples of 40 species of Lepidoptera taken whilst on military service in Scotland, 1941-44. Amongst the exhibits were:—A dark form of *Cryphia* (*Metachrostis*) *perla*, Fb., *Eupithecia tripunctaria*, H.-S. (*albipunctata*, Haw.), var. *angelicata*, Barr., and

E. icterata, Vill., race *cognata*, Steph., from the Edinburgh district. *Brachionycha nubeculosa*, Esp., *Lycia hirtaria*, Clrck., and *Nothopteryx carpinata*, Bkh., from Aviemore, Inverness-shire. *Poecilopsis lapponaria*, Bdv., from Struan, Perthshire. *Apatele menyanthidis*, View., *Hyppa rectilinea*, Esp., *Xanthorhoe munitata*, Hb., *Colostygia olivata*, Schiff., *C. salicata*, Hb., *Venusia cambrica*, Curt., *Entephria caesiata*, Schiff., *Gnophos myrtillata*, Thnbg., and *Bupalus piniaria*, L., from the Glasgow area. Two black-banded specimens of *Epirrhoë alternata*, Müll. (*sociata*, Bkh.), from Inverkip, Renfrewshire, and Dalmahoy, Midlothian. Amongst the *Xanthorhoe fluctuata*, L., was one taken at Inverness on 31st March 1944.

Mr W. J. FINNIGAN.—Lantern slides of (a) nests and eggs of Yellowhammer, Snipe, Chaffinch, Stonechat, Nightingale, Turtle Dove, Reed Bunting, Stone Curlew, Blackbird, Spotted Flycatcher; (b) Flowers—Bee Orchis, Clustered Bellflower, Cuckoo Flower, Herb Paris, Nettle-leaved Bellflower; (c) Fungi—*Clavaria aurea*, Fr., *Lycoperdon echinatum*, Pers., *Calocera viscosa*, Fr., *Verpa digitaliformis*, Pers., *Crucibulum vulgare*, Tul.

Dr E. B. FORD.—(a) The only recorded British specimen of the largest European Fritillary, *Argynnis maia*, Cr. (= *pandora*, Schiff.). It was captured by Mr A. W. Bennett at St Knighton's Kieve, Tintagel, Cornwall, between the 3rd and 9th August 1911, flying with several others over Purple Loosestrife. This seems an unlikely species for anyone to release in England, and, as it occurs in Brittany (contrary to the statements in most text-books), it is just possible that these specimens may have been the progeny of an exceptional migrant. Continental specimens of this species and specimens of *A. paphia*, L., were included for comparison. (b) Two albino specimens of *Argynnis selene*, Schiff., captured within a few hundred yards of one another at Orton, Cumberland, at an interval of ten years. The earlier specimen (9.vii.1924) was taken by H. D. Ford, and the later (7.vii.1934) by E. B. Ford. This occurrence suggests that the form is inherited; probably it is a simple recessive.

Mr H. W. FORSTER.—A few good beetles taken in Epping Forest during 1944, including *Agonum versutum*, Gyll., *Epaphius secalis*, Pk., *Aphodius foetens*, F., *A. tristis*, Pz., *A. sticticus*, Pz., *Corymbites nigricornis*, Pz., *Lyctus brunneus*, Steph., *Zeugophora flavicollis*, Mm., *Donacia thalassina*, Germ., *D. vulgaris*, Zschach, *Pyrochroa coccinea*, L., and a teratological specimen of *Carabus violaceus*, L., with eight legs taken at Chingford.

Rev. WALTER L. FREER.—Lepidoptera, including *Lampra fimbriata*, Schreb., from Chute, Wilts., and Harewood Forest, Hants; *Griposia aprilina*, L., variety from Evershot, Dorset, with typical specimen for comparison; *Plusia iota*, L., a rare variety from Chute, Wilts, with a typical specimen, and *Mesotype virgata*, Hufn., from Chute, Wilts.

Major H. S. FREMLIN.—Varieties of the Lepidopteron, *Aglais urticae*, L., taken wild, and others showing the action of extra warmth when in

the larval condition and the action of vapour of chloride of lime, hydrochloric acid and nitric acid while in the pupal state.

Mr F. D. GOODLIFFE.—A living Coleopteron (Dytiscidae), *Hydaticus seminiger*, Degeer.

Mr F. T. GRANT.—The Coleopteron, *Otiorrhynchus porcatus*, Hbst., recently recorded as new to the South of England. The 5 specimens shown were all taken on and under the same brick burr (over-burnt stock brick) in his garden at Gravesend in April 1942 and 1944. They were difficult to see as they harmonized with the colour of the brick. Also cocoons of a Braconid parasite from the caterpillar of an Eyed Hawk Moth (*Smerinthus ocellatus*, L.) identified by Dr K. G. Blair as *Microplitis ocellatae*, Bou.

Commander G. W. HARPER, R.N.—Lepidoptera taken in Sussex, including *Pieris napi*, L., a female with abnormal hindwings, having symmetrical patches apparently lacking scales, taken 1944; *Leptidea sinapis*, L., male and female of each of spring and summer broods, 1944; a set of *Polyommatus icarus*, Rott., 1944, females showing the prevalence of blue forms; *Aricia agestis*, Schiff., male, 1943, a very dark form, believed to be more usual in the North; *Lysandra coridon*, Poda, 2 males, 1944, with undersides showing extremes of ground colour, and one male, 1944, with heavy black outer margins; *Lycaena phlaeas*, L., 1944, a dark specimen from the second brood, and a light one from the third brood; *Cybosia mesomella*, L., 1944; *Eilema deplana*, Esp., tending to var. *unicolor*, Banks, 1944; *Laspeyria flexula*, Schiff., 1944; *Trichiura crataegi*, L., and cocoon, 1944; and *Herse convolvuli*, L., 5th September 1944.

Mr W. H. A. HARRIS.—Lepidoptera, including (a) *Aphantopus hyperantus*, L., a series of male ab. *caeca*, Fuchs, and two females, one with spots on upperside hindwings obsolete and the other with exceptionally large spots on all wings; (b) *Maniola tithonus*, L., with right hindwing albinistic; (c) *Euphydryas aurinia*, Rott., a short series from the Chilterns, a locality from which it has been absent for many years; (d) *Nymphalis io*, L., three specimens with blind spots on hindwings, bred from wild Hants larvae, July 1944; (e) *Limenitis camilla*, L. (*sibilla*, L.), a series varying from ab. *nigrina*, Weym., L., to normal, collected in Hants, 1941; (f) *Argynnis selene*, Schiff., a short series from Glen Brittle, Skye, May 1935; (g) *A. euphrosyne*, L., dark forms and a light one from Bucks, 1944.

Mr J. L. HENDERSON.—Coleoptera, being nine of the sixty species of Curculionidae that occur in his garden at Purley, Surrey: *Trachyploeus alternans*, Gyll., *Barypithes pellucidus*, Boh., *Gymnetron pascuorum*, Gyll., *G. antirrhini*, Pk., *Ceuthorrhynchus constrictus*, Mm., *C. contractus*, Mm., *C. alliariae*, Bris., *C. asperifoliarum*, Gyll., and *Ceuthorrhynchidius rufulus*, Dufour. The last appears to be an addition to the County list; it is usually found only on the South coast, and the exhibitor has not seen a record for Surrey.

Capt. P. E. N. HITCHINS and Mr W. MURRAY.—Series of the Lepidopteron, *Aglais urticae*, L., showing variation produced by subjecting the

pupae to certain temperatures at different stages of their development.

Capt. R. A. JACKSON, R.N.—Varieties of Lepidoptera, *Pieris napi*, L., a female with brilliant wing underside; *Maniola jurtina*, L., a female with left wing normal, right forewing ab. *pallens*, Thier.-M., together with typical female and female ab. *pallens* for comparison; *Lycaena phlaeas*, L., a male with half the right forewing, and female with half the left forewing straw-coloured; *Lysandra coridon*, Poda, a series chiefly from Salisbury and Winchester. Male undersides from Salisbury showed a tendency to diminished spotting, whilst female undersides from Winchester showed heavy and increased spotting and tendency to amalgamation on forewings. Female uppersides from Winchester showed a tendency to brown coloration. Three dwarf males and a teratological male with large unscaled spots on the forewing were also included. Also series of *Mimas tiliae*, L., bred *ab ovis*, from normal parents showing variation in ground colours and central band; *Endromis versicolora*, L., bred *ab ovo*, from Aviemore; *Lasiocampa trifolii*, Schiff., and *Actebia praecox*, L., from Liverpool; *Cucullia absinthii*, Cl., from Portland, and *C. chamomillae*, Schiff., including ab. *chrysanthemi*, Hb., from Bishop's Waltham; *Caradrina ambigua*, Schiff., from Bishop's Waltham; *Nonagria sparganii*, Esp., male and female, from Lewes; *Oria musculosa*, Hb., from the Salisbury district; Sesiidae bred in 1944, including *Aegeria andrenaeformis*, Lasp., *A. sphecoformis*, Schiff., *A. culiciformis*, L., *A. tipuliformis*, Cl., *A. ruyopaeformis*, Bkh., and *A. flaviventris*, Stdgr. Also a bred specimen of *Cucullia gnaphalii*, Hb., the first recorded from Hampshire for many years.

Mr S. N. A. JACOBS.—Cross pairing of *Hofmannophila pseudospretella*, Staint., ♂, with *Ephestia elutella*, Hb., ♀.

Mr J. M. JAKES.—Short series of Lepidoptera caught or bred in 1944, including *Arctia caja*, L. (minor varieties); *Panaxia dominula*, L., ab. *bimacula*, Cckne.; *Parascotia fuliginaria*, L.; *Deilephila porcellus*, L.; *Argynnis selene*, Schiff., a white variety; *Euchloris smaragdaria*, Fb.; Northern forms of *Phragmatobia fuliginosa*, L., and *Aricia agestis*, Schiff., var. *artaxerces*, Fb., from Aberdeen, with about 400 specimens of various Micro-lepidoptera, including some *Nepticula*.

Mr C. MACKECHNIE JARVIS.—Coleoptera in various stages, including (a) living specimens of the Longicorn, *Saperda carcharias*, L., from Bedford; (b) larvae and beetles of *Dendrophagus crenatus*, Pk., *Pytho depressus*, L., and *Eros aurora*, Hbst., all from Aviemore, Inverness; (c) melanic and typical forms of *Bembidion litorale*, Ol. (*paludosum*, Panz.), *B. punctulatum*, Drap., *B. bipunctatum*, L., and *Asaphidion (Tachypus) pallipes*, Duft., found occurring together at Aviemore; (d) specimens of *Donacia obscura*, Gyll., from Aviemore, and (e) a series of *Brachypterolus vestitus*, Kies., a beetle attacking antirrhinum flowers in a Bedford garden, hitherto only recorded from Cambridge.

Col. S. H. KERSHAW.—Varieties of *Rhopalocera* taken by himself in Beds and Bucks, 1943 and 1944, including *Maniola jurtina*, L., males showing variation in forewing colour patches; *Aphantopus hyperantus*,

L., with hindwing spots on pale band; *Lycaena phlaeas*, L., abs. *subradiata*, B. & L., *suffusa*, Tutt, *schmidtii*, Gerh., *auronulla*, B. & L., *inframarginata*, B. & L., *obsolescens-ignita*, B. & L., *intermedia*, Tutt, and one with spluttered spots; *Polyommatus icarus*, Rott., 3 blue females including one with no red whatever on upper surface, and underside varieties; *Lysandra bellargus*, Rott., including blue females, colour varieties of male upperside and underside, including one approaching the *striata*, Tutt, form of *L. coridon*, and one female entirely blue and black above, no spots or red.

Dr H. B. D. KETTLEWELL.—The Lepidoptera *Arctia villica*, L., and varieties, ab. *radiata*, Spul., a series from Cranleigh district taken in assembling traps, and ab. *wardi*, Mathew, from Dovercourt, also two smoky males and a blackish-suffused female. *Panaxia dominula*, L., varieties (all bred 1944), ab. *albomarginata*, Ktlwl., a series bred represented by homozygous dominants from the broods; ab. *crocea*, Schultz, a bred series also represented by homozygous dominants of the broods (The heterozygous individuals are a variable series, from those with yellowish-spotted forewings to those indistinguishable from typical *dominula*); ab. *juncta*, Cckne., series bred; a small series with the normal red hindwings replaced by pale pink and with the forewing spots all whitish; and another series showing the effect of high sun temperature (in the region of 110° F.), on wild collected larvae. The resulting insects were in appearance modifications of ab. *basi-nigra*, Cckne. Also an extreme ab. *bimacula*, Cckne., bred by H. Newman, 1944, and a small series of ab. *bimacula*, ab. *privata*, Ktlwl., etc.

Rev. J. N. MARCON.—Varieties of butterflies from Surrey and Sussex, 1944, including *Argynnis cydippe*, L., 3 banded males, 1 showing in addition a tendency to resemble ab. *confluens*, Splr. of *A. paphia*; female ab. *bronzus*, Froh., forewings deep black save for costal spot and slight fulvous rays from border; male and female undersides similar to ab. *charlotta*, Haw. of *A. aglaia*, L.; 1 male underside showing obsolescent spotting and 1 female upperside with white patches on both left wings. *A. paphia*, L., 1 large female, ab. *confluens*, Splr., *A. selene*, Schiff., 1 male with black h.w. surrounded by small fulvous spots, and rayed f.w.; 3 females with confluent markings, 2 males suffused and blotched with black markings; 1 male with pale areas over all wings. *Lysandra coridon*, Poda, ab. *fowleri*, Sth., 1 gynandromorph, 1 female ab. *digitata*, Courv., 1 female ab. *pulla*, B. & L. *L. bellargus*, Rott., male resembling ab. *caeca*, Courv., of *L. coridon*; female with one-third of left h.w. splashed with male colour. *Polyommatus icarus*, Rott., various abs., including a male of a rare form described as *increscens-obsolata*. *Lycaena phlaeas*, L., females abs. *auroradiata* and *auronulla*, B. & L., *subradiata*, Tutt, and 1 *intermedia-partim-radiata*, B. & L., and a male underside, ab. *radiata*, Tutt.

Mr P. W. MILTON.—Odonata from Epsom Common, Surrey, including *Ischnura elegans*, Lind., male; *Enallagma cyathigerum*, Charp., male and female; *Erythromma najas*, Hans., male and female; *Lestes sponsa*, Hans., male and female; *Aeshna juncea*, L., female; *A. grandis*, L., male

and female; *Anax imperator*, Leach, female; and *Sympetrum striolatum*, Charp., male and female.

Mr A. M. MORLEY.—Varieties of Lepidoptera, including *Papilio machaon*, L., specimen with narrow bands on forewings, bred by Mr Serpyll from larva found on carrot at Sellinge, Kent, September 1943; *Maniola jurtina*, L., female albinistic on right forewing and left hindwing, and a female melanic underside, both from Wilts; *Lysandra coridon*, Poda, male ab. *caeruleo*, Tutt, male ab. *pulla*, B. & L., and another with underside *ultranubila*, B. & L., male underside ab. *caeca*, Courv., female ab. *inaequalis*, Tutt, female underside ab. *caeca*, Courv., and another with ab. *sagittata*, Courv., on one hindwing; these 8 from Wye Downs, August 1944; male ab. *caeruleo*, Tutt, also ab. *suavis*, Schultz, male ab. *viridescens*, Tutt, male underside ab. *albescens*, Tutt, ab. *obsoleta*, Tutt, and hindwings triangular in shape; female ab. *partim-transformis*, B. & L., these 4 from Wiltshire, August 1944. *Lycaena phlaeas*, L., uppersides female ab. *obsoleta*, B. & L., female ab. *disco-elongata*, B. & L., male ab. *auroradiata*, B. & L., from Folkestone, October 1943. *Cryphia perla*, Fb., an outsize female, and specimens with ground colour ranging from yellow or buff to dark grey, from Folkestone, August 1944.

Mr L. HUGH NEWMAN.—Varieties of Rhopalocera selected from the collection of our late member, Mr H. Wood of Ashford, Kent, including (a) lanceolate and albino forms of *Maniola tithonus*, L.; (b) an albino *M. jurtina*, L.; (c) two albino *Argynnis euphrosyne*, L.; (d) a white *Melitaea athalia*, Rott.; (e) a pair of fine radiate *Polyommatus icarus*, Rott.; (f) radiate varieties of *Lysandra coridon*, Poda, and (g) two fine gynandrous and radiate forms of *L. bellargus*, Rott. Also illustrated articles written by himself for *The Field and Country Life*, entitled "Butterflies in a London Garden," and "The Romance of Rare Hawk Moths."

Messrs G. B. OLIVER and G. H. OLIVER.—Varieties of Rhopalocera, *Agapetes galathea*, L., with shade variation from pearl-white ground to albinistic forms. *Lysandra coridon*, Poda, ab. *syngrapha*, Kef., and a short series of shades *lavendula*, *caeruleo*, *viridescens*, *metallica*. *Polygonia c-album*, L., showing (1) varied shades of ground colour from straw to deep purplish-brown; (2) a wide range of aberrational markings; (3) ab. *hutchinsoni*, Robsn., female (*o-album*), an unusually large specimen with a wing-span of 65 mm. *Leptidea sinapis*, L., male and female of the albino, ab. *ganarew*, Froh.

Mr R. W. PARFITT.—Sesiidae (Lep.) bred in 1944, viz., *Aegeria andrenaeformis*, Lasp., *A. flaviventris*, Stdgr., *A. spheciiformis*, Schiff., *A. tipuliformis*, Cl., *A. culiciformis*, L., and *A. vespiformis*, L.

Mr C. G. PRIEST.—Lepidoptera taken or bred in 1944, including *Saturnia pavonia*, L. (*carpini* Schiff.), *Biston betularia*, L., ab. *carbonaria*, Jord., *Panaxia dominula*, L., *Gonodontis bidentata*, Cl., *Gonepteryx rhamni*, L., *Polyommatus icarus*, Rott., *Hesperia comma*, L., and *Ourapteryx sambucaria*, L.

Mr L. A. E. SABINE.—Varieties of Rhopalocera, *Argynnis euphrosyne*, L., a black-banded female, and a female with rayed forewings and largely

black hindwings, North Sussex, May 1944. *A. selene*, Schiff., very varied series, North Sussex, 1944. Specimens with rayed forewings and black hindwings; with all wings rayed, and central markings obsolete; a yellow male, and banded forms; all May-June: also a series of second brood specimens captured in August. *Lysandra coridon*, Poda, a few specimens taken in August at Royston, including a very pale (almost white) male.

Mr W. H. SPREADBURY.—Photograph of the plant *Phyteuma spicatum*, L. (Spiked Rampion); lantern slides of the moths *Nonagria typhae*, Thnbg., *N. sparganii*, Esp., *Boarmia roboraria*, Schiff., *Hemaris fuciformis*, L., and of the fungi, *Coprinus micaceus*, Fr., *C. plicatilis*, Fr., *Hypholoma fasciculare*, Quél., *Collybia radicata*, Quél., *C. maculata*, Quél., *Mycena epipterygia*, Quél., *Schizophyllum communis*, Fr., and *Polyporus intybaceus*, Fr. Also specimens of the Thorn Apple, *Datura stramonium*, L., of the Fungus *Geaster coronatus*, Schaeff., of the hornet *Vespa crabro*, L., from Ashted, and various parasites.

Mr J. A. STEPHENS.—The following Coleoptera, mostly taken this year in Cobham Park; some are believed to be the first records from this area. *Carabus nemoralis*, Müll., Chatham; *Elaphrus riparius*, L., Doultham and Snodland (new record); *E. cupreus*, Duft.; *Chlaenius vestitus*, Payk., Knight place pond; *C. nigricornis*, F., Snodland (new record); *Stenolophus mixtus*, Hbst.; *Staphylinus compressus*, Mm., in straw; *Paederus riparius*, L., Snodland; *Choleva angustata*, F., in leaves; *Xylodrepa 4-punctata*, L. (new record); *Aulonium trisulcum*, Geoff., from pupa; *Antherophagus nigricornis*, F., from sweet chestnut blossom; *Elater balteatus*, L., beaten from oak (new record); *Athous villosus*, Geoff., from old hornbeam; *Podabrus alpinus*, Payk., 1941 (then new to district); *Tillus elongatus*, L.; *Dorcatoma dresdensis*, Hbst., beating oak and sweeping (new record); *Prionus coriarius*, L., at foot of dead tree; *Phymatodes testaceus*, L., beating maple; *Molorchus umbellatarum*, Sahlb., beating oak (new record); *Stenochorus meridianus*, Panz.; *Lep-tura livida*, F., from sweet chestnut blossom; *Conopalpus testaceus*, Ol., beating dead oak boughs; *Abdera biflexuosa*, Curt., with last; *Mordellistena humeralis*, L., and *neuwaldeggiana*, Panz., beating sweet chestnut; *Apion pomonae*, F.; *Eriirrhinus festucae*, Hbst., New Hythe, on reeds; *Hylobius abietis*, L., on flowers brought into canteen, Chatham. He also showed numerous beetles received from Messrs P. Harwood from Aviemore and the late S. R. Ashby.

Mr HY. J. TURNER.—Butterflies received from his correspondents in South America, (a) a fine series of *Heliconius cyrbia*, Godt., said by Dr Seitz to be "one of the plainest and at the same time most elegant forms of this magnificent genus." Equador; (b) forms of *Heliconius sapho*, Drury, including ssp. *leuce*, Dbldy., race *primularis*, Butlr., and ssp. *cleuchia*, Hew.; (c) a few species of the large Sphingid genus *Xylophanes* from the Neotropical Region of S. America: of this genus Seitz records about 70 species. They are all neatly built insects with sharp-pointed long abdomen, and short blunt antennae and are spread over the whole

of S. America and the W. Indian Islands and at least one species occurs in Mexico. The species shown were *X. tersa*, L., one of the most widely distributed species; *X. chiron*, Dry., ssp. *nechus*, Cr., and *X. tyndarus*, Bdv., *X. porcus*, Hb., ssp. *continentalis*, Roths. & J., *X. titana*, Drce., *X. schausi*, Roth., *X. isaon*, Bdv., *X. anubus*, Cr., the typical form of the genus, *X. xylobotes*, Burm., etc.

Mr H. J. VINALL.—The Lepidopteron, *Maniola jurtina*, L., a pale male taken at Beaulieu Road, New Forest, July 1939.

Lieut. N. A. WATKINS, R.N.V.R.—Varieties of Lepidoptera, including (a) a series of 26 *Euphydryas aurinia*, Rott., bred North Devon, 1943 and 1944, from wild larvae collected each spring and not inbred in captivity. Amongst them were dark forms, rayed forms approaching and including “*fasciata*,” forms showing partial albinism, and in particular (1) extreme melanic female, 9th May 1943, upperside forewing with heavy black wedges and rayed red outer border, hindwings with increased black, and underside hindwings with wide cream-coloured outer border; (2) female, 13th May 1943, upperside cream-rayed and melanic, underside hindwings almost wholly cream-coloured; (3) asymmetrical melanic female, 23rd May 1944, left forewing melanic, right forewing melanic rayed with cream; (4) female, 14th May 1944, left side normal, right pure albino. (b) Series of *Plebejus argus*, L., from a small local North Devon race, 1944, including minor varieties and five fine ab. *flavus*, Tutt, with the lunules varying from yellow to almost white. (c) *Lysandra coridon*, Poda, two extreme ab. *albocrenata*, Tutt, females, from Shoreham, Kent, August 1943, and a female with hindwings of ab. *caeca*, Courv., from Wilts, July 1943. (d) *Polygonia c-album*, L., a female with parts of all four wings bleached to a yellow-cream colour, bred North Cornwall, August 1942.

Dr HAROLD B. WILLIAMS.—Varieties of the moth *Abraxas grossulariata*, L., bred from larvae found by Dr H. B. D. Kettlewell in autumn 1943 in a garden at Birmingham. About 50 moths were bred, including one ab. *radiata*, Raynor, two males with very much reduced spotting, particularly between the orange fascia and the outer margin of the forewings and the outer margin of the hindwings, one example having one hindwing almost entirely white, and a male combining the form last mentioned with ab. *axantha*, Raynor. Three lightly marked examples had the black spotting on the abdomen very much reduced.

Mr N. G. WYKES.—Varieties of Rhopalocera, including (a) *Lycaena phlaeas*, L., a series of 24 showing variation in ground colour and upper-side markings from the Eton district; (b) *Lysandra coridon*, Poda, a series of 60 taken on the Wiltshire Downs in 1943 and 1944, including male uppersides, (1) “*pulla-viridescens*,” a bright green form with buff fringe, a rare and distinctive form, one of three similar specimens taken near Salisbury in 1944; (2) “*post-livida*,” a pale opalescent blue, with hindwing margins of the “*transformis*” type, underside is “*alba-transformis*”; (3) “*neutra-suffusa*,” with greyish suffusion extending inwards over all wings; (4) “*infra-melania*,” with outer area of all wings slate coloured, but not of the ab. *pulla*, B. & L., type; (5) “*ultra-caeruleo*,”

four examples with conspicuously deep blue ground colour, and also "*griseofimbriata*"; (6) "*ultra-albocrenata*," having large white wedges extending inwards from the border markings; (7) *ab. fowleri*, Sth., a good example of the usual form; (8) "*infra-marginata*," with heavy black forewing borders; (9) *ab. latiora*, B. & L., with hindwing marginal spots bordered inwardly with black crescents; (10) *ab. sessilis*, Tutt, with hindwing marginal spots joined to outer margin. Male undersides, (i) "*alba-obsoleta*"; (ii) "*albescens-crassipuncta*," a striking form taken regularly in the Salisbury district; (iii) *ab. caeca*, Courv., five specimens of normal ground colour; (iv) *ab. discreta*, Tutt, a good example with large submarginal spots pushed outwards towards the border; (v) *ab. obsolescens*, Tutt, two specimens with marginal chevrons very faintly marked; (vi) "*discoidalis-nulla*," with forewing discoidal spot almost obliterated. Female uppersides, (i) *ab. albescens*, B. & L., having considerable areas of whitish marking on forewings; (ii) *ab. virgatus*, B. & L., with the orange lunules on all wings joined in continuous bands. Female undersides, (i) *ab. coronetta*, Tutt, with no black border on the inner side of hindwing lunules; (ii) *ab. discreta*, Tutt, three extreme examples; (iii) "*postglomerata*," having the hindwing submarginal and basal spots clustered round the discoidal spot; (iv) *ab. discoelongata*, Courv., having the forewing submarginal spots enlarged inwards in pear-shaped markings; (v) "*pulla-ante-caeca*," having ground colour slate-grey, and white markings largely clouded with grey; (vi) "*ante-alba-caeca*," a practically blind form with conspicuous white forewings; (vii) "*albescens-caeca*," a form blind except for three basal spots on each hindwing, and ground colour extensively marked with white. (c) *Plebejus argus*, L., 13 aberrations from Aldershot area, 1944, including (1) male upperside "*caeruleo*," "*lavendula*," "*transformis*"; (2) female upperside "*flavescens*," "*post-caeruleo-cuneata*"; (3) female undersides "*ultra-nubila*," "*disco-elongata*," and "*sagittata*."

Exhibits, no details of which have been received, were also made by Messrs R. J. Balter, H. L. Dolton, and A. J. Wheeler.

11th NOVEMBER 1944.

The PRESIDENT in the Chair.

Mr S. WAKELY exhibited galls and moths to illustrate his subsequent paper on the Lepidopterous genus *Mompha*, Hb.; Mr Jacobs' coloured drawings of the species of the genus, so far as completed, were also circulated.

The BARON DE WORMS exhibited a pupal case and live imago of the Micro-Lepidopteron, *Acrolepia assectella*, Zell., and read the following note:—"The specimen emerged on 30th October from a cocoon found a few days previously by the exhibitor on a shrivelled leaf of Leek, on which plant the larva is a serious pest, at first mining the leaves and then attacking the roots. It affects Onion plants in a similar way. The insect

has only recently appeared in this country and is being energetically traced and dealt with by the Ministry of Agriculture. On the Continent, where it is quite common, it is said to be double-brooded, one brood in the early summer, but as to the second brood it has apparently not been established for certain whether the pupa goes through the winter, or if the imago hatches in the autumn and lays its eggs before the end of the year, or hibernates and oviposits in the spring."

Mr L. G. PAYNE showed two examples of the beetle *Geotrupes typhoeus*, L., with red-brown elytra. Members suggested that this was due to immaturity.

Mr T. R. EAGLES exhibited the fungi *Boletus piperatus*, Fr., *B. edulis*, F., var. *bulbosus*, Big. & Guill. (a variety caused by the attacks of a parasitic *Hypomyces*), *Trametes gibbosa*, Fr., and *Hygrophorus sciophanoides*, Rea.

Mr S. WAKELY then read his paper on "The Genus *Mompha*, Hb." (See *Trans.*), and after some discussion, in which the President, Mr L. T. Ford and Canon Edwards took part, a very hearty vote of thanks was proposed from the Chair and carried by acclamation.

9th DECEMBER 1944.

The PRESIDENT in the Chair.

The deaths of Lady Maude Robinson, F.R.E.S., of Kirklington Hall, Notts, a member since 1911; and of Mr Bethune-Baker, F.R.E.S., F.Z.S., a well-known non-member, were announced.

The following were declared elected as members:—Messrs Edward John Bedford, F.R.P.S., of 11 St John's Terrace, Lewes, Sussex, and Bruce Swithin Burns, of 1 Jamaica Villas, Stoke Road, Gosport, Hants.; Capt. P. E. N. Hitchins, B.Sc., of Sicklebanc, Horam, Sussex; Messrs Norman Herridge Moody, of 119 Southampton Road, Ringwood, Hants.; Henry John Turner, of 33 Pine Avenue, W. Southbourne, near Bournemouth, Hants.; Edward Frederick Williams, F.R.E.S., of Little Pasture, Brentwood, Essex, and Norman Gordon Wykes, of Carter House, Eton College, Windsor.

Mr S. WAKELY exhibited fruits of the Common (wild) Pear, *Pyrus communis*, L., a somewhat uncommon tree.

Mr F. J. COULSON exhibited the following Coleoptera:—(1) a series of *Caryedon fuscus*, Ol., from West African produce in the London Docks, November 1944 (Fam. Bruchidae); (2) two specimens of *Pachymerus nigriventris*, Pic, from produce imported from Arnstadt, Germany (ex C. McK. Jarvis Coll.). He remarked that an allied species, *Caryopemon* (*Caryoborus*) *cruciger*, Steph., is described (as an importation from the West Indies) in Stephens' *Manual* and figured in Spry and Shuckard; (3) two specimens of an allied species ex Ashby Coll. As to these, Mr E. E. Syms (by whom they were given to Mr Ashby on 16th January 1934) thinks they were taken in Senna pods in a chemist's shop; and (4) a series of broken *Pachymerus chinensis*, L. (♂, *pectinicornis*).

nis, L.), from West African produce in London Docks, November 1944.

Mr E. B. PINNIGER exhibited Dragonflies: (1) two examples of *Libellula depressa*, L., and remarked that the species seems to have become more common at Chingford since old bomb craters on the plain have provided fresh breeding sites; (2) a female *Libellula quadrimaculata*, L., captured attached to the naiad case by the right hind leg, which is crippled.

Mr E. E. SYMS exhibited a number of species of Plecoptera to illustrate his paper.

The BARON DE WORMS exhibited wild-found ova of *Thecla betulae*, L., in the axils of Blackthorn.

The PRESIDENT remarked that the Galleriid moth, *Corcyra cephalonica*, Staint., a recognised warehouse pest, had been found yesterday in large numbers in a warm warehouse. Usually it is not seen after September.

Mr E. E. SYMS then read his interesting paper "Notes on the Plecoptera." (See *Trans.*)

A hearty vote of thanks was moved from the Chair and carried by acclamation.

13th JANUARY 1945.

The PRESIDENT in the Chair.

It was announced that Mr O. C. Davies had been killed in action at Venrai on 1st December last

Miss Margaret Joyce Clark, of 1 Anne Boleyn's Walk, Cheam, Surrey, and Mr Robert Munro Lang, A.C.A., of 9 Tabor Gardens, Cheam, Surrey, were declared elected as members.

The PRESIDENT exhibited a specimen of the Tinaeid moth, *Setomorpha rutella*, Zell., obtained from Sunflower seed meal imported from Buenos Aires, and said this was the first example recorded from the United Kingdom and that the species is associated with stored vegetable matter throughout Tropical and Sub-Tropical parts of both old and new worlds. He also exhibited a Cerambycid beetle—not yet identified—from African hardwood logs.

Mr L. T. FORD exhibited 5 male specimens of the Tinaeid moth, *Elachista holdenella*, Staint., from Bexley, and said:—"This is apparently a very local species, the larva feeding in leaves of *Aira caespitosa*, L., in early April, mining the tips. Stainton, in his *Manual of British Butterflies and Moths* (1859), states that this species was 'once taken near London.' Meyrick, in his *Revised Handbook*, gives as localities 'Middlesex (?), Dorset, very local'." Mr Ford then presented these specimens to the Society's Collection and said he hoped to breed and present females next year. A hearty vote of thanks was accorded to the donor.

Mr H. W. SPREADBURY exhibited the spider, *Pholcus phalangioides*, Fuessl., the "Ceiling Spider," from Poole, Dorset, a coastal species,

and described its unusual method of carrying its egg sac. He also showed distorted galls of *Lipara lucens*, Mg., in Common Reed, from Poole, Dorset. He then showed further slides of British Fungi.

Mr E. B. PINNIGER showed slides of Epping Forest and some of its insects.

A hearty vote of thanks to the exhibitors of the slides was proposed from the Chair and carried by acclamation.

27th JANUARY 1945.

ANNUAL MEETING.

(With which was combined some features of an Ordinary Meeting.)

Mr S. N. A. JACOBS, President, in the Chair.

Reports of the Council and Treasurer, with the Balance-Sheet, were read and adopted. A hearty vote of thanks to the generous donors to the funds during 1944 was proposed from the Chair, and carried with acclamation.

The President announced that the Council had appointed Mr Hy. J. Turner, F.R.E.S., F.R.H.S., as Honorary Life President in recognition of his long and distinguished services to the Society.

The following members were declared elected as Officers and Council for the ensuing twelve months:—*President*—Capt. Reginald A. Jackson, R.N., F.R.E.S. *Vice-Presidents*—Stanley N. A. Jacobs and L. T. Ford. *Treasurer*—T. R. Eagles. *Secretaries*—C. N. Hawkins, F.R.E.S. (*Minuting*); F. Stanley-Smith, F.R.E.S. (*Corresponding*). *Editor of Proceedings*—Office vacant. *Curator*—F. J. Coulson. *Librarian*—E. E. Syms, F.R.E.S. *Council*—H. W. Andrews, F.R.E.S.; Col. P. A. Cardew; R. W. Sparrow, M.Inst.R.A.; S. Wakely; R. J. Burton, L.D.S., R.C.S. Eng.; The Baron de Worms, M.A., Ph.D., etc.; Sir Leonard Wakely, K.C.I.E., C.B.; H. B. D. Kettlewell, M.A., M.B., etc.; W. J. Finnigan, and J. L. Henderson.

The Rev. Desmond P. Murray, of The Priory, Wellington Street, Leicester, was declared elected a member.

Capt. R. A. JACKSON exhibited 2 living females of *Poecilopsis lapponaria*, Bdv., which had emerged on the 19th January after only five days in a temperature of 60°-70° Fahrenheit, and drew attention to the fact that those pupae which are due to disclose imagines the following year develop in the autumn and turn dark brown, while those which will lie over another year, do not develop, and remain light in colour:

The PRESIDENT exhibited 2 small crabs found on mahogany logs from Africa, and pointed out the sharp hooked terminal joint of the claws, evidently adapted for climbing; he also exhibited the cast skin of a large spider showing clearly the skin of the eight ocelli.

The President then read his Address.

PRESIDENT'S ADDRESS.

At the close of my year in the office of President of this Society, the year, by the way, which marks my coming of age as a member, the time has come for me to take stock of the position of the Society, and I can very justly say that, thanks to the efficiency of the Officers and Council, the Society has emerged from a most trying year, still strongly imbued with a progressive spirit. Enemy action against this country during the year has been of the most disturbing kind to the comfort of the civilian population, although it has been weak in military value, and through all this, members have supported meetings in a most gratifying manner. Many members have suffered severe damage to their houses, and have even lost their entire homes during this period but their attendance has been only temporarily interrupted.

The realisation of one of my dreams seems to be on the way, in the suggestion, emanating from your Corresponding Secretary, that an attempt should be made by members specialising in or interested in the Micro-Lepidoptera to produce a series of papers which may eventually be brought together into a book dealing with this most interesting group. Some papers have from time to time been published and others have been promised, with a view to making a start. The venture of including coloured plates in the preceding two issues of the *Proceedings and Transactions* is being continued in this collection, and I have been given the pleasurable task of preparing two coloured plates for the present volume, illustrating the two papers on the Micro-Lepidoptera now to be published. I can only trust that I shall have this pleasure renewed in the coming year and in future years until the whole group has been covered, and that other and more artistically gifted members also may find occasion to ply their brushes to this end.

In spite of the natural difficulties, especially in the arrangement of facilities for tea and travelling far afield, you have heard that a series of interesting Field Meetings have been held, all more or less well attended by an energetic band of field workers. That the venue of all these meetings has been in Surrey is due to the combination of circumstances of a more or less guaranteed interesting bag, and good transport facilities. It is hoped, however, that next season it will be found possible to work in other directions again. Mr Coote's report on the flora and fauna of the Ashted district is awaited with interest, and I hope that similar surveys will be carried out each year.

Death has removed from our midst six members of this Society, the loss of our very good friend, S. R. Ashby, being a particularly heavy blow. Mr Ashby's career with the Society since 1895 has been outlined in the Council's Report, and an obituary notice is also in print, so that it only remains for me to put on record the great esteem in which he was held by all members, and by coleopterists in particular, for his merry and kindly nature and for the lavishness with which his very sound knowledge of Coleoptera in particular and "the other Orders" in general, was put at the disposal of all and sundry who sought it. He was

an ardent field worker, and attended as many of our field meetings as possible, and although he often carried away his spoils in one small tube in his waistcoat pocket, his manifest delight in the opportunity for pursuing his hobby was good to see, and an excellent example to any with the temerity to become blasé, although I am glad to say that few, if any, of our members can justly be included under this head.

Mr Claude Rippon, who joined the Society in 1939, and whose circumstances had only recently altered to permit of his more or less regular attendance at meetings, and acceptance of a seat on the Council, was prevented by illness from making much use of these opportunities, and finally his death brought to a close the promise of his active interest in the Society so recently begun.

Lady Maude Robinson, who died on the 2nd December, was at one time fairly frequent in her attendance at our meetings, her interest being mainly in the agricultural and horticultural aspects of entomology. She was a well-known breeder of Aberdeen-Angus cattle, and also of race horses.

Mr O. C. Davies, a young member who joined the Society in 1938, was killed in action on 1st November, at Venrai, in South-East Holland, whilst leading his troop, by a shell which exploded beside his tank. We have lost the promise of a keen lepidopterist, and the army has lost one more good soldier.

Mr H. Wood of Ashford joined the Society in 1918 and was a keen lepidopterist although his country domicile prevented his regular attendance at meetings.

Mr J. F. Johnstone of Southsea, another lepidopterist, who was regular in his attendance at the Society's meetings until he moved from Claygate to Southsea, completes the list of members who have died during the past year, and I would ask you to stand for a few moments as our token of respect for their memory.

I greatly regret to have to mention that, as already announced, owing to increasing disability, our very good friend, Mr Henry J. Turner, has found himself constrained to relinquish the Editorship of our *Proceedings* which he has held with such distinction for so many years, and as a mark of the affection and esteem in which he is held it is hoped that he will accept the newly created post of Honorary Life President of the Society. Mr Turner joined the Society in 1887, before many of us were born, and he has worked hard for the Society ever since. In 1935 he was elected an Honorary Member, and in 1937, to mark the completion of fifty years of membership, he was presented with an illuminated book containing the signatures of all the members within reach. In his letter resigning the Editorship he very charmingly mentions the pleasure which it has given him to attend the meetings and to share the fellowship of the Society, and I feel sure that I speak for everyone when I say that the fact that this pleasure has been reciprocal doubles its value to all. I trust that when the warmer weather once more comes round we may be afforded the pleasure of seeing Mr Turner at our meetings more often.

The loss of Mr Ashby, and the resignation from Editorship by Mr Turner, faces us with the reality of an omission we have made in the past; we have been fortunate in filling Mr Ashby's office by Mr F. J. Coulson, but when the armed forces members return once more we must get someone to assist Mr Coulson so that there shall be no hiatus. In the matter of Mr Turner, we have not been so fortunate, and the production of the 1944-45 *Proceedings* has been left in the hands of the Publication Committee without a definite Editor. In the past we have left matters too much to our older members, and I trust that our future policy will be to cover all offices with younger members so that they may in due course relieve their elders of the hard work, while still being able to enjoy and utilise their advice and experience, so that they too, in their turn, may be fitted to shape young understudies for themselves.

SOME RECENT IMPORTED INSECTS.

In passing to the customary "second part" of my address, I would have liked to give you a full account of my time spent with the Ministry of Food, Infestation Division, but as there is an official ban on such a thing I must content myself with trying to recount to you, in as interesting a way as I am able, my meeting with various imported insects, not infesting foodstuffs, with some thoughts on their presence in the steamers and some speculations on their chances of survival in this country. It must be borne in mind throughout that the truly infesting insects arrive with the merchandise with which they are associated, and unless appropriate action is taken they augment those of their species already established here, and I will say no more of these regular species.

Generally speaking, Lepidoptera have been rather disappointing in the matter of novelties, the specimen of *Setomorpha rutella*, Zell., recently exhibited here, being my only out-of-the-way find in this order, and this one specimen being dead, there is no danger of its establishing itself here. Stray beetles are the most often found, although many of these are dead when received here, but some very interesting living beetles have come under notice on and under the bark and in the wood of African hardwood logs, and I am sure that with the time to spend in the timber holds, which, unfortunately, I have not, such places would probably produce still more. Hemiptera and Orthoptera have also produced interesting strays, although their determination will in many cases have to be deferred until after the war, when the necessary material will be restored to South Kensington.

Possibly the most spectacular of the stowaways was the giant earwig, *Forcipula quadrispinosa*, Dohrn, a dark blue-black species measuring more than an inch and a half, with forceps something like one-third of an inch in length; I found two of these insects alive and a third crushed, and as was the case with the greater number of interesting immigrants, they were associated with African hardwood logs. Many earwigs of various species are also to be found about these logs and also in parcels of bones from South America. The common centipede, *Scolopendra*

morsitans, L., has also made a single appearance. Then again, many of the mahogany logs are considerably eaten under the bark by the large creamy larvae of the Cerambycid beetle, *Plocaederus viridipennis*, Hope, which has the curious habit of making a calcareous cocoon about the thickness of the shell of a hen's egg, within a more ordinary-looking cocoon of shredded bark spun together. In later cargoes the adult beetles were emerging, and several fine examples of this species were noted. The cold weather here, however, very soon killed them off. These logs also produced a variety of wood-boring beetles of a smaller kind, notably a variety of Scolytid species and a Platypodid species, probably *Platypus penetralis*, Samp., but although I took many examples of these insects with wood in which to work, they all died very soon. Small Scolytidae have also appeared in various kinds of dunnage wood, and I was able to keep some of these, which came in the woodwork of bamboo crates from India, alive for several weeks, and it is possible that these might continue their existence if brought to a warm workshop.

Another interesting species from Africa was a specimen of the " Carpenter Ant " which was found dead, but it is of a size which at once impresses itself on the mind of one not used to a tropical fauna. It was something over three-quarters of an inch in length and of a sooty black colour. Other Hymenoptera in the same steamer were what I took to be the remains of a Cynipid gall wasp, rather similar to our Oak Apple species, and a brilliant bottle-green Hymenopteron, probably a parasite on the gall wasp. However, both specimens were desiccated when found and their dry condition caused them to become so broken in the post as to be unrecognisable when received. These were in galls imported, I believe, for the manufacture of ink.

In amongst sawn wood from Africa I found the little *Silvanus unidentatus*, Fb., a species also found here in the open, and also the small Staphylinid *Falagria concinna*, Er., and it is probable that these little beetles will continue to flourish over here, and, as they are apparently harmless, there is no need to object

Reverting once more to the ever-fruitful hardwood logs, I was also much intrigued by some minute shiny black beetles which ran about most actively during the summer and early autumn months. These were hard to catch without damaging until I thought of the suction bottle used by coleopterists, and then I was able to collect a few of them which Dr Hinton kindly determined as Scaphidiidae, giving it as his opinion that it would possibly prove to be a new species when a specific determination was possible. All this waste of interesting material brings to my mind the fact that in post-war days, with the necessity for secrecy gone, some collector or collectors may be able to find the means to enter the docks in order to collect the insect wealth brought in in these non-edible cargoes. The edible imports will, I suppose, continue to be watched with something like the care exercised to-day.

South American field insects have from time to time been found among the loose seeds at the bottom of the holds of steamers; on two occasions

I have found a beautiful little Chrysomelid, determined as *Diabrotica* sp., and a grey beetle bordered and striped with yellowish buff from the same source identified as *Chelymorpha variabilis*, Boh. For all the determinations, I am indebted to Dr H. E. Hinton, and I make this general acknowledgment to cover all his kindnesses in this respect. In one linseed shipment several Elateridae were found, and on one occasion I found a largish white-haired weevil, unfortunately incomplete, but probably through an oversight this was not named and the specimen has been lost. South America has also produced several Capsid bugs, and here again the inaccessibility of material for comparison has prevented a specific determination being made. One Brazilian beetle found, *Trochoides desjardinsi*, Guér. (Endomychidae), although moderately small and of a light brown colour, was particularly striking by reason of the abnormal development of the antennae, which consist almost entirely of one enlarged joint, I think the second, which had assumed an oval shape about as wide as the thorax.

Another species which appealed to me was a very small steel-blue-black Carabid which on two occasions I found running on the bark of Mahogany logs; this was *Tachys guineensis*, Allu.

As stated at the commencement of my remarks, I have omitted to mention any of the insects of real food-infestation importance, by reason of the official ban on such publication, and my remarks here are of no scientific value, having regard to their gross incompleteness, but I hope that some idea of the possibilities of collecting interesting material in this way may strike the imagination of some amateur entomologists who will in post-war days have access to steamers in port, and spur them to spend some time in accumulating material. I submit that a most interesting and extensive collection might be made along London's waterfront, say from Chelsea to North Woolwich. Most of the material I have taken has either been passed on to the Natural History Museum or to the collections of the Ministry of Food, Infestation Division, but where, for lack of time I have failed to make anything like a co-ordinated collection, others in post-war days may be very successful. Of course, peace-time conditions will reduce the material to be taken ashore, but, if anything, there should be an increase in insects brought here by import steamers, owing to the wider range of materials imported and of exporting countries.

With the end of hostilities, I trust that time will be found for those in authority to publish full details of all the interesting insects that have come before the notice of the Infestation Division, and that the publication will come before the public at a not too far distant date. Such a work would, I feel sure, do a lot to impress on the general public that beside being a mildly interesting hobby, entomology has a practical side which is very closely linked with their personal comfort. A previous President chose for the subject of his address the many cases where entomologists have come to the rescue in matters of medicine, agriculture, industry and commerce, and this matter of infestation, when the

story is told, will, I feel sure, be considered worthy of a place as just one more instance where our favourite science has once more served a very practical turn. In conclusion, I would add that the "mildly interesting" hobby is, in my opinion, the perfect hobby; it can give pleasure throughout life so long as eyes and mind are left to us, it can provide entertainment in fair weather or foul and in adversity or in prosperity. Several men who have contributed greatly to our entomological knowledge have never in the whole course of their lives been in a condition that could be described as affluent, and many, even in days of poverty, have realised the joy of days spent with nature, which cost nothing if the partaker has a bicycle, and yield, in relaxation and entertainment, far greater dividends than do what one may call "artificial entertainment."

Mr Jacobs then inducted Capt. R. A. Jackson, R.N., the new President, to the chair and himself retired.

Capt. Jackson, after thanking the Society for the honour conferred upon him, proposed a vote of thanks to Mr Jacobs for his Address and for his services to the Society throughout the past year as President and for many years as a Secretary of the Society, and asked permission for his Address to be printed in the forthcoming *Proceedings*. Mr Jacobs replied and assented to the request.

A vote of thanks was then proposed by the retiring President to the other Officers and the Council, with particular reference to the Officers. This was seconded by Mr W. J. Finnigan and carried by acclamation. Mr Eagles replied on behalf of the recipients.

FIELD MEETINGS, 1944.

By F. D. COOTE.

Flying bombs and inclement weather were doubtless very largely responsible for the poor record of Field Meetings for 1944. Attendance on the few occasions when such conditions were not operative was generally small.

It had been decided to have a Field Meeting at Ashted once a month in order to obtain a fuller insight into its insect fauna than is possible by occasional visits mostly at the same time each year. Weather and war conditions, however, marred these best of intentions and such records as were made are being held over until next season, when it is confidently hoped they will be more worthy of publication. The short paper read at the Society's meeting at the Chapter House on 10th August 1944 referred to some records of macro-lepidoptera known to occur at Ashted but its incompleteness renders it advisable to await fuller records, together with particulars of micro-lepidoptera and other orders of insects, before publishing any lists.

Districts, other than Ashted, visited during the year were as follows :

BOOKHAM, 26th March. Owing to the tea rooms at Mark Oak Gate being no longer available, the few members who attended this meeting proceeded after lunch by way of " Sallow Lane " to Effingham Common.

EFFINGHAM, 29th April. As on previous occasions, galls containing larvae of *Aegeria flaviventris*, Stdgr., were found. This district was again visited on 16th September, attention this time being mostly devoted to fungi. Those present on this occasion came to the conclusion that in future it would be well not to include Wisley with an Effingham meeting but to devote a full day to each locality.

OXSHOTT, 16th April. Rain this day made collecting practically impossible.

HORSLEY, 10th May. No new records were reported.

The more noteworthy records for the Ashted meetings include the finding by Mr Eagles of larvae of *Aegeria vespiformis*, L. (*asiliformis*, Rott., *cynipiformis*, Esp.) feeding under the bark of an oak stump, on 2nd June 1944, and by Mr Finnigan of imagines of *Griposia* (*Agriopis*) *aprilina*, L. and *Graptolitha ornitopus*, Hufn., on 7th October.

It is hoped that next season it will be possible to revert to the system of appointing a Leader for each Field Meeting.

TRANSACTIONS.

ON THE BRITISH SPECIES OF THE GENUS *LITHOCOLLETIS*, HB.

By S. N. A. JACOBS.

Read 9th July 1942.

With Coloured Plate.

Of the Tinea family Gracilariidae, the genus *Lithocolletis* forms a strong branch, there being upwards of two hundred and fifty species described from various parts of the world, mostly from Europe and North America, but with stragglers from almost all countries, although Meyrick notes that the genus seems to be absent from New Zealand.

Dr Rebel mentions ninety-nine species in the Staudinger list of Palaearctic Lepidoptera, while Le Marchand (*L'Amateur de Papillons*, VIII, July 1936, pp. 83-118) mentions eighty-four species. In passing, I would mention that it was this excellent monograph which suggested to me that I should try to follow Le Marchand and work out, on similar lines, a key for the determination by amateurs of the British species. There are forty-nine species recorded from the British Isles, and of these, all but three, *ulicicolella*, *pyrivorella* and *anderidae*, are known to occur on the Continent. Probably with further investigation, these three species also will be found farther afield.

These moths are more or less uniform in size, say seven to eleven millimetres in expanse, and it is probably this characteristic coupled with their very handsome appearance and the fascinating inter-specific variation of the wing-pattern, and the fact that we have just short of fifty species here, which makes the genus such an interesting one for the micro-lepidopterist.

L. T. Ford, one of our most knowledgeable and successful breeders of micro-lepidoptera has given a piece of sterling advice to those who would study the "micros," that they should leave their nets at home for the first three years of their study of these insects, relying on the collection of larvae for their supply of imagines, which in their turn will be in far finer condition than would have been the case had they been netted. Of course, though this adds to the appearance of the collection, it is far from being the most important point of the advice, for the rearing of the larvae will provide the observant micro-lepidopterist with an unfathomable well of interesting detail for notes and one who can use pencil and colour with material to fill many sketch books, all of which will be of great assistance in the future determination of imagines.

The larvae of *Lithocolletis* are all miners, and in the vast majority of cases are associated with the leaves of trees and shrubs; a very few of them, however, live in shoots and under bark. This latter habit is probably that of our *ulicicolella* and *scopariella*. A very few species are

associated with herbaceous plants, as in the case of *nigrescentella* with *Vicia sepium*, *insignitella* with *Trifolium* and *Ononis*, and *scabiosella* with *Scabiosa columbaria*.

Few species are widely polyphagous, though several are known to feed on two or three closely allied plants, and each species makes a characteristic mine, some species on the upper side of the leaf, and some on the under side, but no British species, and probably no other *Lithocolletis*, is known to mine upper and under side indiscriminately. The foodplant and the position and shape of the mine are very often useful factors in narrowing down the possible species when making our determination.

In the case of the leaf-mining species, the scale-like egg is deposited on the surface of a leaf in a place suitable for the larva to commence its mine immediately on hatching. The larva then leaves the egg through its under surface and enters directly into the thickness of the leaf without coming into the open air. There it proceeds to separate the epidermis from the chlorophyll-bearing cells of the parenchyma. This is performed in an orderly manner, and a patch of skin with parallel sides and oval ends is usually cleared. In the case of species mining the underside, the patch usually occupies the space between two lateral veins of the leaf. The small larva proceeds to line the space with transverse strands of silk, which shrink, causing the epidermis, to which they are attached, to wrinkle. This has the effect of causing the parenchyma to arch away from the epidermis, and form a chamber in which the insect spends the whole of its larval life, feeding on the parenchyma.

Pupation takes place in the mine, the Spring larvae pupating bare, being attached to the silken mat by the cremastral hooks, but the Autumn larvae of many species forming a close silken cocoon within the mine. Certain species, such as *cerasicolella*, pass the winter in the larval stage, only pupating in the early spring. The imago emerges usually in the early morning, and dries off quickly, but does not, in the ordinary course of events, take wing until early evening.

The most polyphagous of our species is *corylifoliella*, which may be found on Hawthorn, Apple (both wild and garden), Pear, Hazel, Way-faring Tree, and Mountain Ash, but the mine is distinct and, whichever foodplant happens to have been selected, the greyish-white skin of the mine, freely flecked with russet, will at once label it as *corylifoliella*. Although primarily attached to *Quercus ilex*, *L. messaniella* is to be found on all species of Oak, and also on Sweet Chestnut. Its mine is on the underside of the leaf and is not so characteristic, being long and narrow between two lateral veins when on chestnut, and oval at its outer end, and bounded by the midrib, when on its more usual foodplant.

The wings of the imago are actually lanceolate, but the presence of long cilia on both fore and hindwings, together with overlapping scales on the forewing, gives them a well rounded appearance. The wing pattern consists, broadly speaking, of a series of wedge-shaped strigulae based on the costa and dorsum. There is sometimes a basal streak running out from the base on to the disc of the wing, which may vary from

something like two-thirds of the length of the wing to less than one quarter. There is often a black apical dot over the point of the forewing, and this is sometimes extended by a black line or diffused mass of black scales, running towards the centre of the disc. The continuation of the wing pattern into the cilia is usually abruptly terminated by a dark line in the cilia known as the "fringe line" which in most cases starts with the last costal strigula, usually above the apical dot, and runs round the tornus. The presence, absence, strength and length of this line are often helpful characters.

Sometimes opposite costal and dorsal strigulae meet to form one or more complete transverse fasciae, sometimes angulated, sometimes straight or curved, and here also is a useful character. The insects resolve themselves into small groups with similar wing pattern, and all of these permit of reasonably easy determination with the exception of one group which feeds on the Rosaceae, such as Apple, Pear, Service, Cherry and Hawthorn. In this group the determination is usually confirmed by reference to the male genitalia, a matter often beyond the power of the amateur, though the surest determining factor.

The hindwings are devoid of pattern, and to all intents and purposes unicolorous, though the shade of the cilia may darken apically.

The wing pattern is tolerably constant in each species, though minor variations occur in the matter of degree. For instance, a basal streak may or may not run into a dorsal strigula, or the colour in general may vary in intensity, but extreme variation is scarce. I do possess a specimen of *L. sylvella* devoid of all markings excepting an apical streak and fringe-line, but such cases are extremely rare.

For the purpose of description here, the colour of the strigulae will not be considered as the ground colour, but the colour of the space between the strigulae will be used. A close examination of the strigulae will show that they are edged on both sides, the inner side, the outer side, or not at all, with a darker shade, and both the ground colour and this edging of the strigulae will find their place among the determining characters.

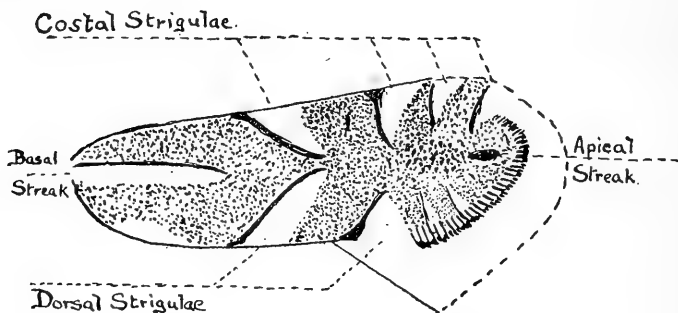


Fig. 1.

Fig. 1 represents a more or less normal type of wing pattern. It shows dorsal and costal strigulae, an apical streak, a basal streak and the fringe line. Below the basal streak there is often a small patch of white, which is not counted among the strigulae. Outside the fringe line, the cilia are usually self-coloured, but in the apical cilia there may appear an "apical hook" (Fig. 2) which may be of one of three types. It may be a stoutish bristle or group of bristles emanating from the apical dot and running out through the cilia to a point a little outside the cilia contour, which I will call "type 1"; it may exhibit itself as a darkening of the tips of the cilia from the last costal strigula, round the costal arc of the cilia, which is "type 2"; or it may take the form of a bristle structure, as in type 1, but, instead of arising out of the apical dot, starting as a tangent to the fringe line at the last costal strigula, in which case the contour of the cilia is usually slightly falcate: this is known as "type 3."



Fig. 2.

Finally, there may be an entire absence of hook of any type.

The head is clothed with a tuft of semi-erect longish scales, more or less divided in the middle, and the face is covered by a triangle, apex upwards, of close thick scales.

In using the key which follows, the student should, for a start, commence at the beginning and work steadily through, reading the whole of the couplets, but he will very soon come to recognise the various groups, and will also probably find distinguishing features of his own for separating the species. I would again like to stress the point that examination of the genitalia is really the only sure means of separating the species of the "Rosaceae" group.

KEY TO BRITISH SPECIES.

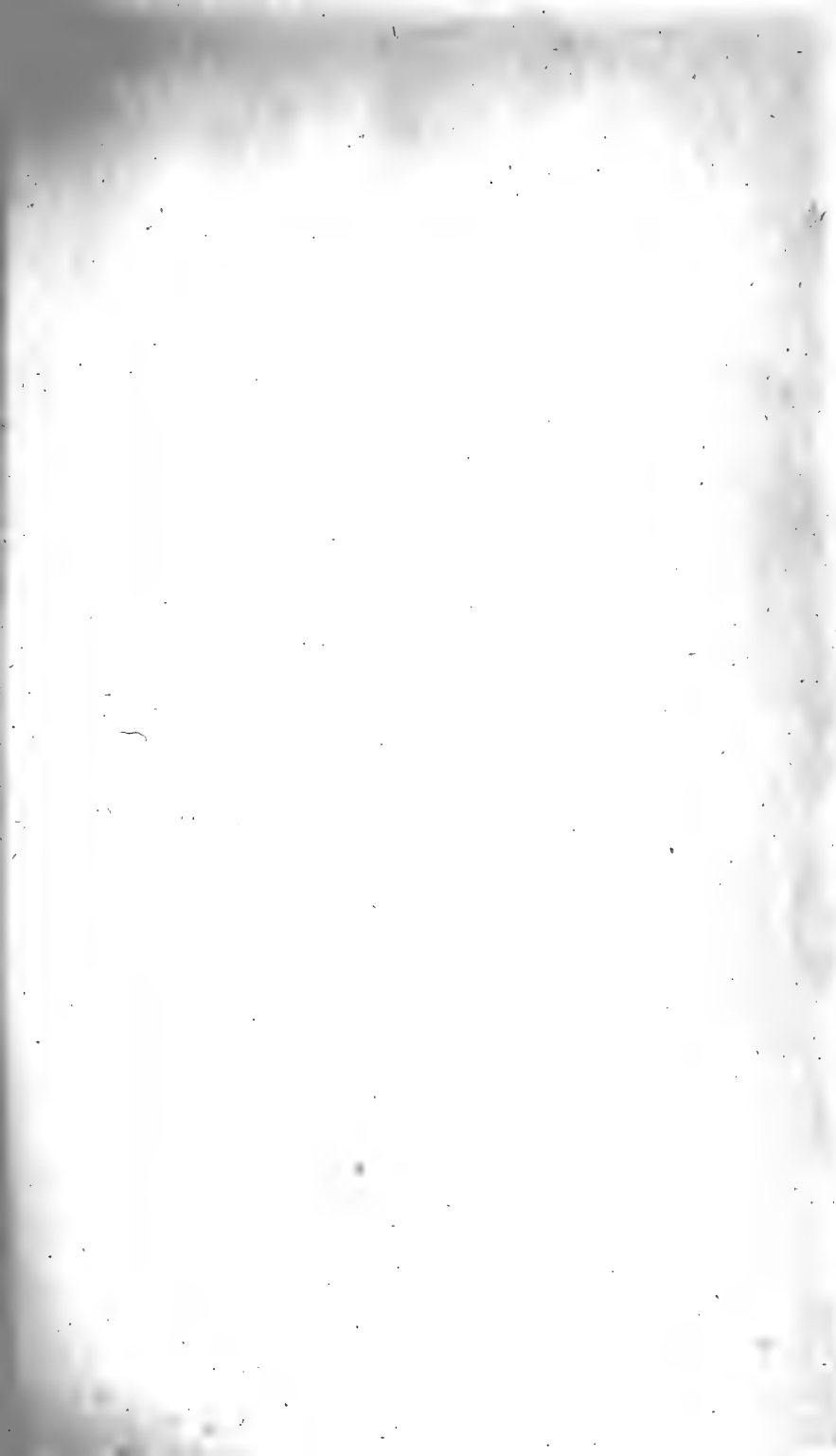
(The number before each specific name is the serial number of that species in the "descriptions" *post.*)

1.	Ground colour white	2.	
—	Ground colour not white	9.	
2.	A broad oblique brown fascia from base of costa to $\frac{1}{2}$ dorsum		1. <i>robotis</i> .
—	No such band	3.	
3.	Ground more or less sprinkled with dark scales		45. <i>comparella</i> .
—	Ground clear white	4.	

4.	Strigulae linear or cuneiform	5.	
—	Strigulae broad and sub-parallel	7.	
5.	No basal streak		2. <i>cramerella</i> .
—	Basal streak	6.	
6.	Dark basal streak from base of costa to junction of first costal and dorsal strigulae		4. <i>heegeriella</i> .
—	Broad white basal streak lightly shaded brownish-buff on sides, slightly dark edged on upper edge of outward extremity, extending to second costal and dorsal strigulae		3. <i>tenella</i> .
7(4).	Apical cilia falcate, apical hook type 2		47. <i>hortella</i> .
—	Apical cilia not falcate, no apical hook	8.	
8.	Second strigulae meeting in an obtuse angle ...		48. <i>sylvella</i> .
—	Second strigulae meeting in an acute angle		49. <i>genticulella</i> .
9(1).	Thorax metallic	10.	
—	Thorax not metallic	13.	
10.	Thorax silvery	11.	
—	Thorax brassy	12.	
11.	Basal streak; no complete fasciae		33. <i>lautella</i> .
—	No basal streak; two complete fasciae		34. <i>schreberella</i> .
12(10).	Strigulae shining white, ground orange-brown		42. <i>kleemannella</i> .
—	Strigulae slightly brassy, ground dark brown		40. <i>froelichiella</i> .
13(9).	Basal streak obtusely angulate at middle upwards	14.	
—	Basal streak not so angulate	15.	
14.	Ground straw-coloured, dusted with darker scales; 5 costal, 3 dorsal strigulae		10. <i>scopariella</i> .
—	Ground chestnut-brown; 2 costal, 2 dorsal strigulae		44. <i>corytifoliella</i> .
15(13).	Ground clear golden yellow; long narrow basal streak; violet sheen at apex; small apical dot	16.	
—	No apical violet sheen; apical dot not small ...	17.	
16.	Costal strigulae pale yellow; basal streak to $\frac{1}{2}$; apical hook type 2		5. <i>messantiella</i> .
—	Costal strigulae white, basal streak past $\frac{1}{2}$; no apical hook		6. <i>quercifoliella</i> .
17(15).	First costal and first or second dorsal strigulae forming or almost forming an acute angle	18.	
—	First costal and first or second dorsal strigulae not forming an acute angle	33.	
18.	Costal hook type 2	19.	
—	No costal hook	21.	
19.	Costal hook strong and black		8. <i>distentella</i> .
—	Costal hook not black	20.	
20.	First costal strigula extended along costa almost to base; forewings golden-brown		11. <i>carpinicolella</i> .
—	First costal strigula short; not extended towards base; ground colour bronzy brown ...		12. <i>coryll</i> .
21(18).	Cilia dark above apex		7. <i>alnifoliella</i> .
—	Cilia not dark	22.	

- | | | |
|---------|--|------------------------------|
| 22. | Small species; ground golden-orange | 23. |
| — | Larger species; ground not golden | 24. |
| 23. | Strigulae strongly dark-edged inwardly; basal streak often joining first dorsal strigula ... | 14. <i>spinirolella</i> : |
| — | Strigulae not dark edged, or only slightly so ... | 9. <i>ultriclella</i> . |
| 24(22). | Forewings shining orange-brown, strigulae sharply black edged inwardly; basal streak narrow, outer $\frac{1}{2}$ sinuate upwards | 15. <i>cerasiclella</i> . |
| — | Forewings not orange-brown; basal streak not sinuate | 25. |
| 25. | Ground shining light fuscous; strigulae dark edged but not black edged; apical streak black and heavy | 13. <i>faginella</i> . |
| — | Forewings not shining fuscous; strigulae black edged | 26. |
| 26. | Ground shining copper-brown; inner edge of second costal strigula making a quarter circle | 16. <i>sorbi</i> . |
| — | Ground shining copper; inner edge of second costal strigula straight or slightly curved | 27. |
| 27. | Ground shining copper-brown; both sides of first dorsal strigula more or less evenly curved | 20. <i>blancardella</i> . |
| — | Ground shining copper-brown, first dorsal strigula not evenly curved | 28. |
| 28. | Smallish species; ground copper-brown, a whitish area below apical streak and above fringe line | 21. <i>oxyacanthae</i> . |
| — | Ground dark brown or golden-chestnut and dark brown | 29. |
| 29. | Dark bronzy-brown ground; first dorsal strigula obtusely angulate outwards at about $\frac{1}{2}$ its length; outer portion sub-parallel | 19. <i>concomitella</i> . |
| — | First dorsal strigula not thus angulate; not sub-parallel | 30. |
| 30. | Ground brown, strigulae golden; apical streak long and strong; continued by dark scales towards middle of wing | 43. <i>viminiella</i> . |
| — | Strigulae not golden | 31. |
| 31. | Ground golden-chestnut; strigulae white | 18. <i>mespilella</i> . |
| — | Ground dark golden closely sprinkled with dark brown scales | 32. |
| 32. | Costal strigulae small, dorsal large; first dorsal strigula crescent shaped | 17. <i>pyrivorella</i> . |
| — | Costal and dorsal strigulae large; first costal opposite second dorsal; first dorsal strigula trapezoidal | 46. <i>amyotella</i> . |
| 33(17). | Second costal opposite first dorsal strigula ... | 23. <i>quinqueguttella</i> . |
| — | First costal opposite first dorsal strigula | 34. |
| 34. | First costal and dorsal strigulae forming or almost forming a right angle or an obtuse angle | 35. |
| — | One or more straight or slightly curved fasciae formed or almost formed by the junction of pairs of costal and dorsal strigulae | 39. |

35. Ground clear orange; third costal and dorsal forming a narrow curved fascia, other strigulae clearly separated; some mirror-like scales in apical spot 24. *junoniella*.
 — Strigulae not obviously remote 36.
36. Ground light orange, dark edging of first costal extended to join the dark edging of second costal strigula; dark edging of basal streak extended to apical streak 22. *lantanelle*.
 — Ground shining golden-brown 37.
37. A large whitish patch on dorsum meeting basal streak at about middle 26. *viminetorum*.
 — White patch on dorsum not reaching basal streak 38.
38. Fringe line very indistinct excepting at apex 25. *salicicolella*.
 — Fringe line distinct to second dorsal strigula 27. *cavella*.
- 39(34). One straight or slightly curved fascia formed or almost formed by first costal and dorsal strigulae 40.
 — More than one fascia 44.
40. Ground brown 41.
 — Ground golden-orange 42.
41. Strigulae white; short broad basal streak 28. *spinoletta*.
 — Strigulae brassy, narrow basal streak 29. *ulmifoliella*.
- 42(40). First strigulae not meeting to form a fascia ... 31. *nigrescentella*.
 — First strigulae forming an uninterrupted fascia 43.
43. Small species, fascia edged inwardly only; strigulae wedge shaped 30. *anderidae*.
 — Larger species, fascia edged both inwardly and outwardly, strigulae with inward extremities rounded 32. *insignitella*.
- 44(39). Fasciae preceded by a heavy dark band widest on costa and dorsum 35. *trifasciella*.
 — Dark edging of fasciae not unduly wide on costa or dorsum 45.
45. Fasciae edged inwardly with a few dark scales only 36. *emberizipennella*.
 — Fasciae dark edged inwardly 46.
46. Ground dark brown, 5 costal and 4 dorsal strigulae, first two pairs forming fasciae; strong fringe line 39. *stettinensis*.
 — Ground not dark brown 47.
47. Small species, ground orange-brown, fasciae clear white and obviously black edged; diffused black scales in apical area, fringe line obscure 37. *scabiosella*.
 — Fasciae not clear white 48.
48. Fasciae brownish-white, brown fringe line; brown ground darkening towards fasciae 38. *tristrigella*.
 — Fasciae slightly brassy, black apical streak and fringe line, brown ground not obviously darkening towards fasciae 41. *nicelii*.



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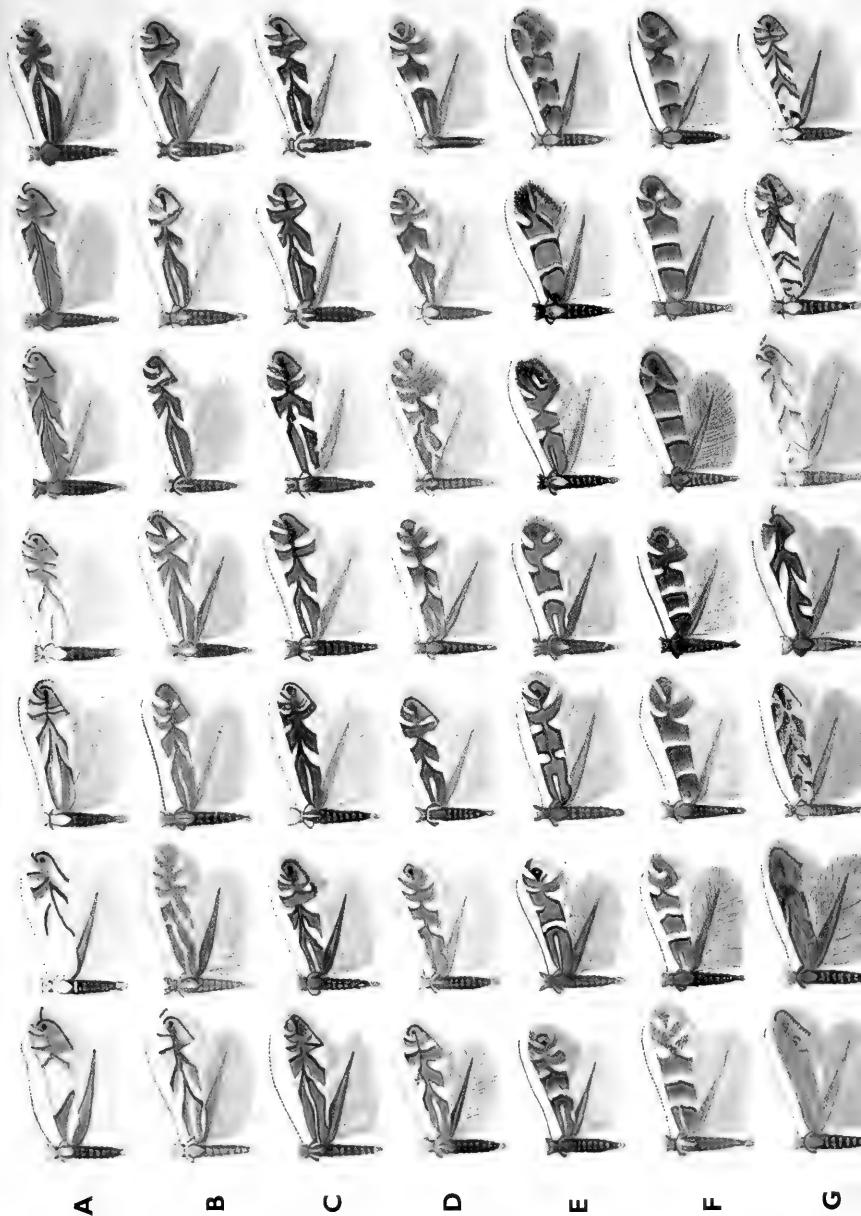
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A	roboris	cramerella	tenella	heegeriella	messaniella	quercifoliella	alnifoliella
B	distentella	scopariella	ulicicolella	carpinicolella	coryli	faginella	spinicolella
C	cerasicolella	sorbi	pyrivorella	mespilella	concomitella	blancardella	oxycanthe
D	lantanelle	quinqueguttella	junoniella	salicicolella	viminetorum	cavella	spinolella
E	ulmifoliella	anderidae	nigrescentella	insignitella	lautella	schreberella	trifasciella
F	emberizipennella	scabiosella	tristrigella	stettinensis	frœlichella	nicelli	kleemannella
G	viminiella	corylifoliella	comparella	amyotella	hortella	sylvella	geniculella



X3.

S.N.A. Jacobs

BRITISH SPECIES of the GENUS *LITHOCOLLETIS* Hb.

DESCRIPTIONS OF SPECIES.

1. *Roboris*, Zell. Face and scape shining white; head whitish; antennae light brown basally, shading to white at tips; thorax and tegulae pure white. Forewings white with a transverse curved fascia from the base of costa to $\frac{1}{3}$ dorsum, golden-brown edged distally with darker brown; three costal, one dorsal strigulae narrowly edged outwardly with sooty-black, the first costal



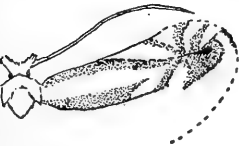
and the dorsal strigulae meeting in an obtuse angle; apical dot clear; complete fringe line enclosing a pale golden area below costal strigulae; black apical hook type 1. Hindwings pale fuscous; cilia white. Underside of forewings sooty-brown, cilia white showing costal strigulae faintly. Underside hindwings sooty-brown, cilia white. Two broods, larva 7 and 9-10 giving imagines 8 and 5. The larva mines the leaves of the two common oaks, *Quercus sessiliflora* and *Q. pedunculata*. Meyrick states that the mine usually has some green left as a central patch, though this is the case with many species. Le Marchand states that the mine is usually at the edge of the leaf near the petiole, on underside. Widely distributed in Britain but local; Central and South Europe to Asia Minor.

2. *Cramerella*, Fab. Head, antennae, thorax and tegulae white; antennae becoming greyish distally. Forewings clear white at base, becoming golden tinged towards apical $\frac{1}{3}$; 3 costal, 2 dorsal strigulae represented by sooty lines; fringe line strong; apical dot clear and round; golden area bounded outwardly by fringe line; costals more or less straight, first dorsal curving to-



wards apex, second dorsal curving upwards; cilia white, brownish tipped at apex. Hindwings pale whitish-grey; costal cilia pale fuscous, dorsal cilia white. Larva 7 and 9-10, producing imagines 8 and 5 respectively. Larva mining leaves of Oak on the underside; oval mine showing green on upperside, usually in disc of leaf between two lateral veins. Very common throughout Britain to Clyde, and in the Central and Southern parts of Europe.

3. *Tenella*, Zell. Head and thorax white. Forewings white; four costal, three dorsal strigulae ochreous - fuscous strongly edged outwardly with sooty-brown; first, second and third costals and second dorsal meeting at about $\frac{2}{3}$; basal streak sooty somewhat interrupted, but to be traced from base to apical streak; apical streak jet-black; fringe line complete, strongest at apex, fading dorsally; apical hook type 2. Hindwings silvery-grey; cilia light fuscous. Larva 7 and 9-10, producing imagines 8 and 5 respectively.



Larva mining the underside of leaves of Hornbeam, a long narrow mine between two ribs, larva usually clearing all the parenchyma. Locally common throughout Britain excepting in the North; more or less throughout Central Europe.

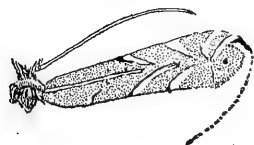
4. *Heegeriella*, Zell. A small species. Head, antennae, thorax and tegulae white. Forewings white to $\frac{1}{2}$,



slightly brassy beyond $\frac{1}{2}$, darker inside strigulae; four costal, three dorsal strigulae, sooty; a sooty linear basal streak from base of costa to about $\frac{1}{3}$; first costal and dorsal not quite meeting, but enclosing an acute angle; second costal and dorsal meeting in an obtuse

angle; fringe line strong terminally, weakening dorsally; apical dot drop-like, sometimes shading off into a fine line towards junction of second strigulae; cilia white showing an indistinct apical hook type 2. Hindwings pale greyish-brown, cilia white. Larva 7 and 9-10, producing imagines 8 and 5. The larva mines underside of Oak leaves usually making a small blotch under a lobe of the leaf, turning the upper side back so that it shows from below. Found locally throughout Britain excepting the extreme north; on the continent through France and Central Europe.

5. *Messaniella*, Zell. Face white; head yellow, thorax yellow. Forewings clear yellow; four costal, four dorsal strigulae faintly yellow, all finely black edged inwardly; long narrow basal streak to $\frac{1}{2}$; fine clear fringe line; small clear apical dot; a violet sheen between dot and fringe line at apex. Hindwings greyish fuscous; cilia fuscous.



Larva 3-4, 7, 9-10, producing imagines 5, 8, and 11. Commonest in *Quercus ilex*, but also in other kinds of Oak and occasionally in Sweet Chestnut and Hornbeam. A somewhat fusiform mine in underside. Early brood only in *Q. ilex*. Found commonly throughout Britain excepting extreme north, and Eastern Ireland. Abroad through Central and South Europe, North Africa and Asia Minor.

6. *Quercifoliella*, Zell. Differs from the above species in that the costal strigulae are white and there is no apical hook. Basal streak to beyond $\frac{1}{2}$. Larva 7,



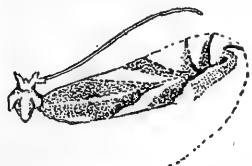
9-10, producing imagines 8 and 5. The larva mines the underside of Oak leaves forming a somewhat oval mine, and, excepting when in very thin leaves, some green usually remains visible from above after the larva has

finished feeding. Britain and Ireland, plentiful wherever Oak trees are to be found. Europe and Asia Minor.

7. *Alnifoliella*, Dup. Face white; head mixed white and fuscous; thorax and tegulae white marked fuscous. Forewings variable from dark fuscous through golden-brown to a mixture of whitish and fuscous; four costal three dorsal strigulae white, dark edged inwardly; wide pointed basal streak to $\frac{1}{3}$, dark edged above; fringe line distinct but cleanly cut by third dorsal strigula; cilia light fuscous, darker above at apex. Hindwings fuscous; cilia brownish fuscous. Larva 7, 9-10, producing imagines 8 and 5; mining underside of leaves of Alder. The egg is usually placed near the junction of a lateral rib with the midrib, and the resulting mine is normally bounded by the midrib, and the basal part of two lateral ribs. Common throughout Britain excepting North Scotland, also in North and East Ireland; abroad throughout North and Central Europe.



8. *Distentella*, Zell. Face white; head white with a few fuscous scales; thorax and tegulae white; collar light straw; antennae white ringed light fuscous. Forewings light straw mixed with a few darker scales; four costal and three dorsal strigulae rather strongly edged dark fuscous, excepting third dorsal strigula which is not so edged; basal streak lightly edged above near extremity; first dorsal strigula extended along dorsum to base by a white line; apical strigulae on costa rather wide; apical dot small; a slight apical streak; fringe line not very strong; cilia whitish with a strong projecting apical hook type 3. Hindwings brownish fuscous; cilia whitish with slight brown tinge. Larva 7 and 9-10, producing imagines 8 and 5; mining the underside of Oak leaves. Local in the Midlands of England; abroad through France and Central Europe.



9. *Ulicicolella*, Staint. Face white; head orange mixed fuscous, white in centre; thorax shining saffron; antennae shining greyish-white ringed grey. Forewings bright shining saffron; four costal, three dorsal strigulae, and basal streak reaching to about $\frac{1}{4}$, all silvery-white and not appreciably dark edged; fringe line complete around apex but disappearing at outer edge of second dorsal strigula; apical streak and dot somewhat obscure, but the disc dusted centrally with blackish scales from the extremities of the second strigulae to position of apical dot. Cilia whitish, slightly fuscous. Hindwings rather dark fuscous, cilia whitish fuscous, slightly golden. Larva possibly feeding through the winter and pupating in spring; imago 6-7. The larva is attached to Furze, and probably mines under the softer bark of the new growth shoots. Found locally throughout Britain; not so far recorded from abroad.



10. *Scopariella*, Zell. Face white; head dark fuscous; thorax whitish dusted fuscous; antennae silvery-white. Forewings straw-coloured liberally dusted with darker brown scales; five costal, four dorsal strigulae, white, the basal streak narrow and angulate at middle to meet middle of first costal strigula; second costal meeting first dorsal strigula. Hindwings greyish fuscous, cilia light brownish fuscous. Larva probably 8-5, producing imago 6-7. Larva mining in the bark of shoots of Broom. Locally in South and Midland England; abroad in Central Europe.



11. *Carpinicoella*, Staint. Face white; head white mixed fuscous; scape shining white. Forewings golden-yellow; four costal and three dorsal strigulae shining white; first costal strigula long, straight, and very oblique, extended by white line along costa almost to base of wing; third dorsal wide, contained within fringe line; basal streak fairly wide, pointed, to $\frac{1}{3}$, sometimes slightly dark edged above; black apical streak; cilia whitish fuscous; a slight apical hook, type 2. Hindwings shining light fuscous; cilia whitish fuscous. Larva 7 and 9-10, producing imagines 8 and 5. Larva mining the upperside of leaves of Hornbeam, causing some contortion of the leaf. Local in southern half of England, and abroad through Central Europe.



12. *Coryli*, Nic. Head dirty white, mixed fuscous; antennae grey. Forewings usually shining tawny but sometimes darker; four costal, three dorsal strigulae, first costal rather short and not extended towards base of costa, third dorsal strigula contained by fringe line, which is rather strong and black; basal streak narrow to $\frac{1}{3}$, not dark edged, apex tending to golden-yellow; apical streak fairly strong, black and slightly arcuate, the concave side upwards; cilia whitish; a slight apical hook, type 2. Hindwings shining grey; cilia light fuscous. Larva 7, 9-10, producing imagines 8 and 5; larva in leaves of Hazel, mining the upper side; often four or five mines in one leaf contorting it very strongly. Found more or less commonly throughout England, and through North and Central Europe.



13. *Faginella*, Zell. Face white; head fuscous; thorax fuscous with white streak; antennae shining grey, ringed fuscous. Forewings golden darkening to dun before strigulae, which are sooty edged inwardly but not black edged; four costal, three dorsal strigulae, rather dull white; dorsum white edged at base; basal streak to $\frac{1}{3}$, rather wide and drawing in to a sharp point; apical



streak strong, black; fringe line round apex only, slightly longer below than above apex; cilia pale fuscous. Hindwings and cilia pale fuscous. Larva 7, 9-10, producing imagines 8 and 5; larva mining underside of Beech leaves, making a long narrow mine between two lateral ribs. Plentiful throughout Britain excepting the extreme north; abroad through Belgium and France to Central Europe.

14. *Spinicolella*, Zell.



Face white; head light buff, slightly mixed fuscous; thorax bright saffron with shining white central line; tegulae as thorax edged inwardly with shining white. Forewings bright saffron more or less sprinkled with dark scales; four costal strigulae, two clear dorsal and two somewhat confluent, inside fringe line, sometimes parting it; narrow

basal streak, slightly downward curved, outwardly dark edged above; strigulae dark edged inwardly; fringe line usually complete, but sometimes broken by last two dorsals; apical streak fairly strong; cilia whitish fuscous. Hindwings pale grey; cilia pale whitish with light brown sheen. Larva 7 and 9-10, producing imagines 8 and 5; mining underside of Blackthorn and Plum, giving a rolled effect to Blackthorn leaves, and contorting Plum leaves rather more strongly than is usual with *Lithocolletis* mines. Common throughout Britain excepting the extreme north, and abroad through Belgium and France to North and Central Europe.

15. *Cerasicolella*, H.-S.



Face white; head orange mixed dark brown; thorax and tegulae orange, thorax with white central line, tegulae white edged inwardly; scape clear white; antennae white, fuscous ringed. Forewings reddish saffron; four costal, three dorsal strigulae clear white, finely black edged inwardly; first pair of strigulae meeting in an acute angle; basal

streak rather narrow, a little past $\frac{1}{2}$, outer half slightly sinuate upwards; black apical streak to third strigulae, fine, with some diffused black scales round it; fringe line from fourth costal to third dorsal strigula strongest above apex; some iridescent scales between apical streak and fringe line; cilia slightly golden-white. Hindwings brownish-grey; cilia slightly golden light fuscous. Larva 7 and 9-4, producing imagines 8 and 5, mining underside of Garden Cherry and Gean, making a rather wide mine between two lateral ribs; the larva does not pupate until after the late winter frosts. Rather local through England to Yorkshire; abroad through France and Central Europe.

16. *Sorbi*, Frey. Face white; head ferruginous; scape white above; antennae shining grey slightly darker ringed; thorax and tegulae bright saffron, thorax with white streak; tegulae whitish edged inwardly; collar white. Forewings bright reddish-saffron; four costal, three dorsal strigulae clear white, first costal and first and second dorsal dark edged on both sides; basal



streak to past $\frac{1}{3}$, edged above and slightly below; fringe line strong at apex only, ceasing at second dorsal strigula; strong black apical streak; cilia whitish, becoming golden at apex. Hindwings fuscous; cilia whitish with coppery sheen. Larva 7 and 9-10, producing imagines 8 and 4-5, mining underside of leaves of Mountain Ash, and Bird Cherry. Local through Britain, and abroad through Belgium and France to North and Central Europe.

17. *Pyrivorella*, Banks. Face white; head fuscous; thorax dark fuscous; tegulae white edged inwardly. Forewings dark fuscous brown, dusted with a few coppery-golden scales; four costal, three dorsal strigulae rather shining white, edged inwardly by a darkening of the ground colour, dorsals 1 and 2 edged on both sides; basal streak a little past $\frac{1}{3}$, slightly dark-edged



above and about one-quarter below at apex; first dorsal strigula curved at base and then tapering straightly, only a little above the horizontal; blackish apical streak somewhat obscure; fringe line strong; area between apical streak and fringe line more or less whitish, in which the third dorsal may be distinguished by a slightly wider area without streaks of the ground colour; cilia whitish fuscous. Hindwings fuscous; cilia whitish fuscous. Larva 5-6, 7, 9-11, producing imagines 7, 8 and 4; larva mining the underside of Pear leaves, and, it is said, occasionally Apple. This species is stated to be local through the south of England to West Midlands, and at present it seems to be unknown on the Continent. The genitalia are said to be indistinguishable from those of *mespilella*, and it is possibly a varietal form of that species.

18. *Mespilella*, Hb. Face white; head orange fuscous; thorax bright coppery-brown; tegulae inwardly edged white; scape white; antennae shining grey fuscous, darker ringed. Forewings shining coppery-brown; four costal, three dorsal strigulae, white; indistinct light patch between apical streak and fringe line; first strigulae edged on both sides, a patch of dark scales between



the extremities of second strigulae; apical streak rather long with a few diffused dark scales; cilia light fuscous. Hindwings grey fuscous; cilia slightly coppery. Larva 7 and 9-10, producing imagines 8 and 5, mining

the underside of leaves of Mountain Ash, Service Tree and Bird Cherry. Probably embracing as one species *pyrivorella* (q.v.). Locally in South and Midland England, also locally in Ireland. Abroad through France and Central Europe.

19. *Concomitella*, Bankes. Face white; head white mixed dark brown; antennae white, ranged dark brown; tegulae and collar almost entirely white; thorax dark brown with a white spot at posterior extremity. Forewings dark brown, four costal, two clear dorsal strigulae, sometimes a third dorsal inside fringe line; first and second pairs edged on inside and partly on outside,



others edged only inwardly; wide basal streak often meeting first dorsal strigula; apical streak slightly diffused; fringe line rather irregular, enclosing lighter brown area; cilia whitish fuscous, darker at apex. Hindwings light grey; cilia slightly brown. Larva 7 and 9-10, producing imagines 7-8 and 4. The larva makes a rather broad mine in the underside of Apple leaves, usually between two lateral ribs. Common throughout England, and abroad through France and Belgium across Central Europe.

20. *Blancardella*, Fab. Face white; head orange fuscous, mixed dark fuscous; thorax copper-brown; tegulae broadly white edged; antennae whitish, ringed dark fuscous. Forewings dark copper-brown; four costal, three (sometimes four) dorsal strigulae shining white, all strigulae dark edged inwardly, first pair edged on both sides; basal streak to about $\frac{1}{3}$ dark edged



above and to about $\frac{1}{4}$ below; apical streak black, diffused; fringe line strong and complete, enclosing one, sometimes two, clear dorsal strigulae; cilia whitish, coppery between fourth costal and last dorsal strigulae. Hindwings and cilia dark fuscous grey. Larva 7 and 9-10, giving imagines 8 and 5; larva in underside of leaves of Crab Apple and sometimes in Garden Apple. Generally distributed through England, and abroad throughout Europe.

21. *Oxyacanthae*, Frey. Face white; head dark fuscous; thorax dark golden-brown; tegulae broadly white inwardly, collar white mixed brown; central thoracic streak white. Forewings dark golden-brown, shading off to golden at apex; strigulae white, four costal, two clear dorsals, sometimes one or two discernible within the fringe line, otherwise the area is white with dark fuscous



streaks; fringe line not very dark but strongly marked and extending from fourth costal to second dorsal; apical streak to third costal strigula,

slightly diffused; cilia slightly golden-whitish. Hindwings shining grey; cilia slightly golden fuscous. Larva 7 and 9-10, producing imagines 8 and 5; mining underside of the leaves of Hawthorn, usually in a lobe of the leaf, which is gathered into a cylinder. Common through England and abroad through France and Belgium across Central Europe.

22. *Lantanelle*, Schrank.



Face white; head orange, thorax golden-yellow with a central white streak; tegulae lightly white edged inwardly; antennae whitish golden, ringed fuscous. Forewings bright golden yellow; four costal, and three dorsal strigulae shining silvery white, dark edged inwardly, dark edge of first and second costal strigulae more or less distinctly

joined, first and second dorsal strigulae with dark edge extended round the point to about half way down the outer side; basal streak edged above and below, sometimes meeting the first dorsal strigula; a dark shade running along the tips of the dorsal strigulae, and joining the apical streak, where it becomes black; the dark line from first and second costal strigulae also meets the beginning of the apical streak; fringe line fairly strong; cilia light golden. Hindwings golden fuscous; cilia fuscous with a golden sheen. Larva 7 and 9-10 producing imagines 8 and 5 respectively, mining the underside of leaves of Wayfaring tree and Guelder Rose, in both of which several mines may be found in one leaf. It is also occasionally found in Mountain Ash leaves. The mines tend to distort the leaves considerably. Fairly generally through Britain, and abroad in France and Central Europe.

23. *Quinqueguttella*, Staint.



Face golden-whitish; head orange; thorax golden; tegulae white edged inwardly; antennae golden, ringed fuscous. Forewings golden; five costal, three dorsal strigulae, shining white, all inwardly edged blackish, as is the small white spot on the dorsum under basal streak, second and third costal and first and second dorsal strigulae

squared at the tip, the first dorsal strigula coming between the first and second costal strigulae, and rather nearer to the latter, the fourth costal strigula long and fang-shaped reaching to centre line of wing; basal streak to about $\frac{1}{2}$, dilated and slightly turned upwards at tip, black edged all round; apical streak very short and fine; apical dot clear but small; fringe line at apex only, between fifth costal and third dorsal strigulae; cilia white. Hindwings light fuscous; cilia slightly golden. Larva 7 and 9-10, producing imagines 8 and 5, and mining the underside of leaves of Dwarf Sallow, making a long mine along the edge of the leaf and turning the top side under. Found locally through England and abroad through France to Central Europe and on to Eastern Siberia.

24. *Junoniella*, Zell. Face white; head orange; thorax orange brown; antennae shining whitish golden. Forewings bright orange; four costal and three dorsal strigulae shining white, dark-edged inwardly, the first and second dorsal strigulae slightly edged outwardly also, third pair meeting in an almost straight dark-edged white fascia; black fringe line from fourth costal almost to second dorsal strigula; apical streak diffused; cilia whitish with golden sheen. Hindwings golden fuscous; cilia fuscous. Larva 4-5 and 7, imagines 5-6 and 8, mining the under-side of Bilberry leaves. High ground in Britain from Midlands northwards; on the continent in the Pyrenees and mountainous districts of Central Europe.



25. *Salicicolella*, Sircom. Face white; head fuscous; thorax brassy brown with slight white central streak; tegulae white edged. Forewings slightly brassy brown; four costal and three, sometimes four dorsal strigulae commencing white and becoming slightly brassy outwards and shading into the dark sooty edge of the inward edge of the next strigula, strigulae set in pairs, the first sometimes joining to form an obtuse angulate fascia; basal streak sinuate, first rising, then dipping at the middle and rising again at the end, reaching to about $\frac{1}{2}$; an indefinite white spot on dorsum not reaching to the basal streak; dorsum not edged white; rather wide diffused apical streak; fringe line rather firm at apex, very weak thereafter; cilia whitish fuscous. Hindwings shining whitish grey; cilia light fuscous, darker above; a slight brassy sheen. Larva 7 and 9-10, producing imagines 8 and 5, mining under-surface of leaves of various Sallow species, principally *Salix caprea*. Rather common throughout Britain excepting the extreme north, abroad through Belgium and France to North and Central Europe.



26. *Viminetorum*, Stt. Face slightly brassy white; head dark fuscous; thorax brassy brown. Forewings brassy brown; four costal and four dorsal strigulae white; a white patch on dorsum meeting the middle of the basal streak; dorsum edged white from base to about $\frac{3}{4}$; first and second pairs of strigulae slightly dark edged inwardly; apical dot small and not very clear; fringe line clear only at extreme apex, otherwise very indistinct; basal streak fine, slightly flexed upwards from middle, outer half slightly dark edged below. Hindwings dark grey; all cilia brassy fuscous. Larva 7 and 9-10 giving imagines 8 and 5, mining the under surface of leaves



of Osier, usually turning the side of the leaf under. Found locally through Britain excepting the extreme north; abroad through Belgium and France to Central Europe.

27. *Cavella*, Zell. Face white; head white, mixed fuscous; thorax golden ochreous; tegulae white on shoulders; scape white; antennae white, very lightly ringed greyish. Forewings golden yellow; four costal, three dorsal strigulae white, edged sooty black inwardly, the dark edge of the first costal strigula extending along costa to base, first costal strigula rather



short and somewhat squared, first dorsal strigula usually strongly curved, second pair almost meeting to form an obtuse-angled fascia; basal streak to $\frac{1}{2}$, dark edged above, top edge straight, lower edge sinuate, narrowest at middle, and terminating in a point; fairly strong fringe line from fourth costal to third dorsal strigula; sometimes just passing the latter, by which it is then divided; cilia slightly golden. Hindwings dark greyish fuscous, cilia light fuscous, slightly golden. Larva 7 and 9-10, producing imagines 8 and 5; mining the under surface of Birch leaves. Local through southern England to Midlands; abroad through France and Belgium to North and Central Europe.

28. *Spinolella* Dup Face white; head light fuscous; antennae shining white at base, ringed dark grey from about $\frac{1}{3}$; thorax brassy brown with white central streak; tegulae slightly white - edged inwardly. Forewings dark brown with a reddish golden sheen in basal half; four costal, three, sometimes four dorsal strigulae white, inwardly dark edged; basal streak to about



$\frac{1}{2}$, only occasionally dark edged at the tip; first strigulae forming a clear white slightly curved fascia; apical spot indistinct; fringe line barely discernible; cilia whitish. Hindwings whitish-grey; cilia light fuscous, slightly brownish tinged. Larva 7 and 9-10, giving imagines 8 and 5, mining the under surface of the leaves of Goat Willow. Common through Britain excepting in the north; abroad through Belgium and France to North and Central Europe.

29. *Ulmifoliella*, Hb. Face slightly brassy white; head dark fuscous, almost black; scape blackish; antennae slightly golden fuscous, darker ringed. Forewings dark sepia brown with a golden sheen; four costal and three dorsal strigulae shining silver white, the first pair forming a uniform outwardly curved fascia, strigulae dark edged inwardly; basal streak to



about $\frac{1}{2}$, dark edged above; fringe line to third dorsal strigula; a grey

apical hook type 1; cilia fuscous, darker between apical hook and fourth costal strigula. Hindwings brownish fuscous; cilia light brownish fuscous. Larva 7 and 9-10 giving imagines 8 and 5, mining the under surface of Birch leaves. Common throughout Britain; abroad through France to North and Central Europe.

30. *Anderidae*, Fletcher.*

Face white; head orange fuscous; thorax orange brown; cilia white above; scape golden; antennae shining white, ringed fuscous. Forewings shining golden orange; four costal and three dorsal strigulae, shining white, the first pair making a transverse fascia, the inner edge dark and sinuous or curved outwards, the outer edge more or less



straight, dark edging of second dorsal continuing on to third costal strigula; basal streak narrow, to $\frac{1}{4}$, dark edged above and for the greater part of its length below; fringe line short, from fourth costal to third dorsal strigula; cilia whitish, dark fuscous above apex and between second and third dorsal strigulae; apical dot large and diffused. Hindwings brownish fuscous; cilia whitish fuscous. Larva 7 and 9-10 giving imagines 8 and 5; mining the under surface of leaves of Birch seedlings, usually preferring those well down amongst the heather. Locally recorded from Kent, Sussex and Dorset. This species has not so far been recorded from the Continent. *L. irradiella*, Scott, described from "near Renfrew among Birches," considered by Stainton to be a new species, but included with *L. lautella*, Zell. by Meyrick, seems to me to refer to *L. anderidae*, my reasons for this being that *anderidae* is a Birch species while *lautella* is attached to Oak, and that Scott's figure (*Trans. Ent. Soc.*, Vol. iii, n.s., Pl. I) shows an orange-brown thorax whereas the thorax of *lautella* is shining silvery.

31. *Nigrescentella*, Logan.

Face silver; head sepia with a golden sheen; antennae golden at base, becoming shining white, lightly ringed fuscous; thorax and tegulae orange brown. Forewings shining golden saffron. Differs from *anderidae* in that it is a larger insect; that the apical cilia are uniform light brownish fuscous; that there are a few mirror-like



scales in the black of the apical dot; and that the first pair of strigulae do not meet properly but are separated by the inward dark edge which runs round the extremity of each strigula. Larva 7 and 9-10, giving imagines 8 and 4-5; mining the under surface of leaves of Bush Vetch (*Vicia sepium*); also recorded from Clovers and Medick. It is found locally throughout Britain and abroad through Belgium and France across Central Europe to Austria.

*The text figure and that in the coloured plate were drawn from different specimens.

32. *Insignitella*, Zell.

Face silvery white; head dark sepia; thorax shining golden saffron; tegulae slightly more brassy; antennae dark fuscous, white ringed near apex. Forewings golden saffron; four costal, three dorsal strigulae silver white, the first pair forming a more or less parallel sided obtuse angled or slightly curved fascia, first and second pairs strongly

edged inwardly and slightly on outward side; basal streak edged above and below, to $\frac{1}{4}$; apical dot large and slightly diffused; fringe line to second dorsal strigula; cilia brownish fuscous, lighter towards apex. Hindwings brownish fuscous; cilia light fuscous, darkening towards apex. Larva 7 and 9-10 giving imagines 8 and 5; mining underside of leaves of Rest-Harrow and sometimes Clovers. Local at widely different parts of England; abroad across Central Europe to Austria.

33. *Lautella*, Zell.

Head black; face and thorax shining leaden metallic; scape silver-grey; antennae silver-grey, ringed black. Forewings rich shining golden brown; three costal and three dorsal strigulae in pairs, silver white, the first pair almost meeting to form an almost straight fascia, the third dorsal strigula represented by a silver-white spot below the apical

streak, not reaching the tornus; basal streak to about $\frac{1}{4}$, narrow at base and slightly dilated towards its extremity; strigulae and basal streak all dark edged both inwardly and outwardly; fringe line complete; apical streak black, the area below it and bounded by fringe line, more or less densely irrorated with black scales; cilia light fuscous. Hindwings greyish fuscous; cilia fuscous. Larva 7 and 9-10 giving imagines 8 and 5; mining the under surface of leaves of the Sessile Oak (*Quercus sessiliflora*), preferring the leaves of seedlings and the lower leaves of bushes. Found locally throughout Britain excepting the north; reported from Eastern Ireland and abroad from Central Europe.

34. *Schreberella*, Fab.

Head black; face and thorax leaden metallic; antennae black, white tipped. Forewings vermillion golden; three costal and three dorsal strigulae silver, the first two pairs forming two slightly sinuate and roughly parallel fasciae running slightly outwards from the costa to the dorsum, 3rd costal running obliquely inwards; 3rd dorsal

starting vertically and then inclining sharply outwards; a black patch at the base of the costa and the apical region thickly sprinkled with black; apical streak black in a patch of silvery scales; fringe line very faint or absent; cilia dark fuscous. Hindwings greyish fuscous; cilia

light fuscous, darkening to blackish at apex. Larva 7 and 9-10 giving imagines 8 and 5, mining the under surface of leaves of Elm between two lateral ribs; often patches of green left visible on the upper surface when the larva has ceased feeding. The winter brood pupates in an emerald green fusiform cocoon. England and Eastern Ireland, usually very common; abroad through Central and South Europe to Asia Minor.

35. *Trifasciella*, Haw. Face white; head dark orange-brown; thorax orange brown; tegulae fuscous on shoulder; antennae white, ringed dark fuscous. Forewings orange brown; fasciae white, preceded by a dense blackish band dilating at costa and dorsum, the first fascia almost straight, the second obtusely angulate outwards in top half and inwards in bottom



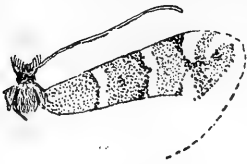
half, the third costal strigula preceded by a heavy blackish band, but only a slight dark spot before the third dorsal strigula, fourth costal followed by a patch of dark scales; a patch of dark scales running obliquely from under third costal strigula towards termen; cilia light tawny at apex, darkening to fuscous at dorsum. Hindwings brownish grey, cilia fairly light fuscous. Larva 3-4, 7 and 10 producing imagines 5, 8, and 11; mining the under surface of Honeysuckle leaves, usually causing the leaf to fold transversely. Generally common throughout Britain with the exception of the extreme north, and in Eastern Ireland; abroad through Central and Southern Europe to Asia Minor.

36. *Emberizipennella*, Bouché. Generally speaking a large species. Face white; head brownish orange; collar and tegulae whitish; thorax coppery brown; antennae whitish, ringed dark fuscous. Forewings coppery brown; strigulae dead white; a short white basal streak without dark edging; first fascia straight or slightly convex outwardly, second fascia making an

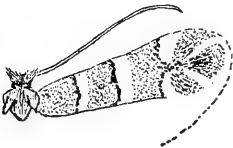


obtuse angle, inwardly distinctly blackish edged, third strigulae almost meeting, being separated by a small patch of dark loosely sprinkled scales, and having the appearance of two outwardly concave arcs meeting at the middle of the disc; fringe line almost obsolete, represented only by a brown arc in the apical cilia. Hindwings and cilia whitish fuscous. Larva 7 and 9-10, giving imagines 8 and 5; mining the under surface of Honeysuckle leaves contorting the leaf strongly, often conically. Throughout Britain excepting the most northerly part of Scotland but more local than the preceding species; abroad through Central and South Europe to Asia Minor.

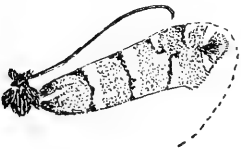
37. *Scabiosella*, Dougl. Face shining greyish; head orange; antennae white; ringed dark grey. Forewings bright orange-brown; strigulae white, strongly black-edged inwardly, in opposite pairs, first and second pairs forming fasciae, the first almost straight, the second slightly obtuse angled; a dusting of black scales distally from third dorsal strigula, and at apex; no fringe line; cilia dark brown. Hindwings grey fuscous; cilia brownish fuscous. Larva 8 and 10-4, giving imagines 8-9 and 5; mining the under surface of lower leaves of the Lesser Scabious (*Scabiosa columbaria*) apparently with a preference for the leaves of seedlings. In Britain this species seems to be confined locally to the Surrey chalk hills. The mines are plentiful, but show a very high rate of parasitisation. Abroad the species is recorded from Germany, France, Switzerland and Austria.



38. *Tristrigella*, Haw. Face whitish; head brown; thorax cinnamon brown. Forewings shaded brown; four costal and three dorsal strigulae, shading from whitish to brown, the first and second pairs making fasciae, approximately straight, the first inclined outwards towards the dorsum, the second slightly inwards at dorsum, the third pair opposite, but not meeting, not very dark edged, and somewhat indefinite. Hindwings light brownish grey; cilia fuscous, darker on costal side at apex. Larva 7 and 9-10 giving imagines 8 and 5; mining the under surface of Elm leaves between two lateral ribs. The mine is very similar to that of *schreberella* but the larva does not spin a green cocoon. Found locally throughout England and through North and Central Europe.



39. *Stettinensis*, Fab. Face shining white; head blackish; antennae blackish, white tipped. Forewings shining dark brown; five costal and four dorsal strigulae, shining silvery-white, first two pairs of strigulae meeting to form slightly curved fasciae, third dorsal between third and fourth costal strigulae; fringe line complete; apical dot large and somewhat diffused. Hindwings dark greyish brown; cilia fuscous. Larva 7 and 10 producing imagines 8 and 5; mining the upper surface of leaves of Alder, making a brown fusiform mine on a lateral rib, which runs through the centre of the mine. It is also rarely found on Birch. Found through Britain excepting the north of Scotland; abroad in Central Europe where it is local but plentiful where it is found.



40. *Froelichiella*, Zell.

Face and thorax brassy; head orange. Forewings dark umber brown; strigulae distinctly brassy, the ground colour darkening evenly towards the inside edge of strigulae rather than any dark edging, though a slight dark line is discernible; five costal and four dorsal strigulae, the first two pairs forming slightly curved fasciae; fringe



line complete, enclosing a brassy patch beyond apical dot; cilia blackish to fringe line, thereafter light fuscous, the fourth dorsal strigula being slightly discernible as a parting in the black cilia. Larva 7 and 9-10, giving imagines 8 and 5, mining the under surface of Alder leaves, making a broad mine between two lateral ribs, usually away from the midrib. Local throughout England and southern Scotland; abroad through Northern and Central Europe.

41. *Nicelli*, Stt.

Face white; head orange; thorax light brown; antennae white, ringed dark grey, becoming white at tips. Forewings orange brown; five costal and four dorsal strigulae, white, the first two pairs forming outwardly convex fasciae, the third pair not meeting, strigulae narrowly but clearly edged blackish inwardly; apical streak elongated and



rather wide; fringe line strong round apex, weakening more or less dorsally; cilia fuscous. Hindwings brownish-grey; cilia light brownish fuscous. Larva 7 and 9-10 producing moths 8 and 5; mining the under surface of Hazel leaves, often four or more larvae in one leaf, strongly contorting the leaf. Common throughout Britain excepting in the extreme north; found abroad, through France and Central Europe.

42. *Kleemannella*, Fab.

Face and thorax brassy; head orange. Forewings clear orange brown; four costal and four dorsal strigulae, shining white, inwardly dark edged, the first two pairs forming two transverse fasciae slightly curved outwards at the middle, the fourth costal strigula slightly dark edged outwardly, the fourth dorsal strigula represented by a white

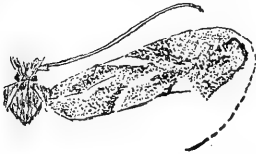


spot not reaching the fringe line; terminal area more or less densely sprinkled with blackish scales; slight apical dot; cilia thickly black to fringe line which is distinct at apex and fades dorsally; apical cilia light brownish. Hindwings greyish fuscous; cilia fuscous, darkening at lower part of apex. Larva 7 and 9-10 giving imagines 8 and 5; on under side of Alder leaves, making a largish mine between two lateral ribs not usually touching the midrib. Found throughout Britain excepting the north, and abroad through Central and South Europe to Asia Minor.

43. *Viminiella*, Stt. Face golden; head golden brown; antennae shining white, ringed grey-fuscous; thorax golden yellow with lighter central streak. Forewings golden brown; four costal and three dorsal strigulae golden, first and second costal and second dorsal very slightly dark edged inwardly; a dark diffused line from second dorsal strigula to apical streak; fringe line from outer edge of fourth costal to inner edge of third dorsal strigula; cilia light golden. Hindwings shining whitish grey, cilia light fuscous, slightly golden. Larva 6-7 and 9-10, producing imagines 8 and 5; mining the under surface of leaves of Sallow and Osier, usually at the edge near the base. Local through Britain, North Europe, Belgium, France, Holland and Germany.



44. *Corylifoliella*, Haw. Face white; head fuscous mixed chestnut; thorax light chestnut; tegulae light chestnut, edged white; white thoracic streak. Forewings chestnut; two costal and two dorsal strigulae, the first pair white and the second pair lighter than ground colour, first pair meeting to form an acute angled fascia; a fine basal streak slightly angulate at middle, not quite meeting fascia; apical streak somewhat diffused; fringe line strongest at apex, weakening dorsally; cilia light brown outside fringe line becoming more fuscous dorsally. Hindwings brownish fuscous; cilia fuscous. Larva 7 and 9-10 giving imago 8 and 5; feeding on a variety of trees and bushes including Apple, Hawthorn, Hazel, Mountain Ash, and Pear. It mines the upper surface of the leaves, separating a large area of the upper cuticle of the leaf; in the case of thin leaved trees, there is considerable contortion, but on Apple and Pear there is little distortion. The mine may be recognised by its whitish-buff surface sprinkled with russet flecks. An insect reported from Birch from Scotland as *L. betulae*, Zell., is considered by Meyrick to be *corylifoliella*. Common through Britain excepting the extreme north, and abroad through North and Central Europe.



45. *Comparella*, Zell. Face white; head mixed white and greyish fuscous. Forewings white, sprinkled with greyish-fuscous scales; four ill-defined costal strigulae, three dorsal, greyish fuscous, darkening distally; cilia whitish, darker tipped at apex. Hindwings shining greyish fuscous; cilia fuscous. Larva 7 and 9-10, giving imagines 8 and 10-5, making an oval mine in the under surface of leaves of Abele, usually between two lateral ribs. Meyrick mentions Black Poplar also. At the completion of feed-



ing, often the whole of the green parenchyma has not been eaten, leaving green blotches in the mine visible from the upper surface of leaf. Local through southern England and abroad through Central and Southern Europe to Asia Minor.

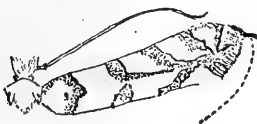
46. *Amyotella*, Dup.



Face white; head dark golden brown; thorax shining golden brown. Forewings shining golden brown; three costal and three dorsal strigulae, clear white, first costal and first and second dorsal strigulae dark edged on both sides, other strigulae edged inwardly, first dorsal strigula rather square, second dorsal opposite first costal strigula; slight

apical streak; fringe line complete to third dorsal strigula; cilia whitish; a strong costal hook type 3. Hindwings grey, slightly golden; cilia whitish fuscous with a slight golden sheen. Larva 7 and 9-10 producing imagines 8 and 5; mining under surface of leaves of Oak. Local through Western Midlands to the North of England; abroad through France and the Lusitanian Peninsula, also Central Europe.

47. *Hortella*, Fab.



Face shining white; head white; thorax white; collar fuscous; antennae white. Forewings clear white; five costal and three dorsal strigulae, yellow, first costal and dorsal at about $\frac{1}{4}$, meeting in a fascia, edged outwardly only, second and third costal strigulae edged both sides, fourth and fifth edged outwardly; second and third dorsals

edged both sides with sooty fuscous scales; apical hook type 2; apical cilia falcate. Hindwings white; cilia white. Larva 7 and 9-10, giving imagines 8 and 5, mining the under surface of Oak leaves; according to Le Marchand, preferring *Quercus sessiliflora*. Occurs in the Southern two-thirds of England and abroad through South-east and Central Europe.

48. *Sylvella*, Haw.



Face, head and thorax white; antennae white, ringed with fairly dark grey. Forewings white; at the base three short sooty strigulae (none reaching the other side of the wing), two from the costa and one from the dorsum, which last almost meets the second costal strigula; the first fascia making an obtuse angle and the second making an acute

angle, the third fascia a straight line; the apical streak long and slightly irregular, meeting the apical dot; the area below this streak is white, edged golden, and merging into a sooty-fuscous fringe line; a white wedge above the apical streak bounded above by a band of mixed golden and fuscous streaks, in which are embodied the last

two costal strigulae, the fasciae golden yellow; cilia pale fuscous. Hindwings shining whitish grey; cilia pale fuscous. Larva 7 and 10, giving imagines 8 and 5, mining the under surface of leaves of Hedge Maple, usually across a lobe so that it is bent back so strongly that the edge of the lobe is closely pressed against the under surface of the leaf. The species is common throughout England, and abroad through Central Europe.

49. *Geniculella*, Rag. Face, head and thorax white; antennae whitish fuscous. Forewings white; fasciae golden-yellow; at base two short striae from costa and one from dorsum between them, first fascia an acute angled chevron, the point often produced to meet the second chevron which is about a right angle, third fascia an obtuse angle, the point of which meets the point of the second fascia, the fourth fascia not so clearly defined, but about parallel to the third; sometimes a slight apical streak; apical dot very black; fringe line strong at apex, weakening dorsally; cilia white; no apical hook. Hindwings light fuscous; cilia light fuscous. Larva 7 and 10, giving imagines 8 and 5; mining the under surface of Sycamore leaves, the upper part of the tree being favoured, the mine being rather short and broad. The insect has only recently been added to the British list, and seems at present to be confined to the southern half of England, but when further search has been made, it will probably be discovered more widely. Meyrick gives Oxford as the locality, but the insect has been found in many parts of Kent, Surrey, and Sussex. Abroad it is found in Central Europe.



A word on the breeding of *Lithocolletis* species may not come amiss. The spring imagines are the easiest to deal with, for in almost all cases one has but to collect the mines in the autumn, keep them through the winter, and wait for the imagines in due season. The mines can be wintered best either by putting them into cotton bags and hanging these up out of doors in a spot which is neither too sunny nor too bleak, but in one where there is ample moisture, and then bringing them in under cover about the middle of April. The mines should then be put into flower pots, of which the tops have been ground level with silver sand and water on a flat stone, as advocated by Ford, partially filled with coarse potting sand. An alternative method is to put the mines straight away into the flower pots in the autumn, and stand these out of doors in a shady place, bringing them indoors for observation in the middle of April.

The summer brood is not so easy to handle; Lhomme and Le Marchand advocate, where possible, watching the mines until they are judged to be fully developed, and then picking the leaves, which should be stored in a cool place in flat cigarette tins with closely fitting lids. These should be examined indoors each morning near a closed window so that any emerging moths would be attracted to the light. The insects may best

be captured from the window by covering them with a small glass tube in which is a piece of blotting paper which has been moistened with acetic ether. The alternative is again the use of flower pots, but in this case, the coarse sand should be topped with an inch or so of fine sand which should be kept moist, and the stems of the leaves should be stuck into the sand. The pots should be covered with muslin instead of glass so that specimens shall not be spoiled by the condensation which would inevitably form on a glass cover.

A list of food plants with their associated insects is given in order to assist in the identification of mines by narrowing down the number of probable species, which should greatly assist in the determination of the resultant imagines. The list is of course not final, for occasionally, probably by accident, eggs are deposited on the wrong food plant. As an example of this, I have found the mine of *L. stettinensis* on Birch and again on Elm, although the food plant is Alder, but such occurrences are rare, and cannot rightly be included as food plants. For simplicity, as in the cases of Sallow and Oak, the broad head has been given to include all species, and special species are only mentioned where they are taken entirely or preferably by the larva.

Plant.	Surface of leaf or other situation.	Species.	Notes.
Abele	—	—	See Poplar, White.
Alder (<i>Alnus glutinosa</i>)	Upper	<i>stettinensis</i>	
	Under	<i>alnifoliella</i>	
	Under	<i>froetichiella</i>	
	Under	<i>kleemannella</i>	
	Upper	<i>corylifoliella</i>	
Apple, Crab (<i>Pyrus malus</i>)	Under	<i>blancardella</i>	Prefers wild to cultivated.
	Under	<i>concomitella</i>	
	Under	<i>pyrivorella</i>	Occasionally only. As for crab apple above.
Apple, cultivated varie- ties of <i>Pyrus malus</i>	—	—	
Beech (<i>Fagus sylvatica</i>)	Under	<i>faginella</i>	
Bilberry (<i>Vaccinium myrtillus</i>)	Under	<i>junoniella</i>	
Birch (<i>Betula alba</i>)	Upper	<i>stettinensis</i>	Rarely.
	Under	<i>anderidae</i>	Seedlings.
	Under	<i>cavella</i>	
	Under	<i>ulmifoliella</i>	
Blackthorn	—	—	See Plum.
Broom (<i>Cytisus scoparius</i>)	In bark of twigs	<i>scopariella</i>	
Cherry, Bird (<i>Prunus padus</i>)	Under	<i>sorbi</i>	
	Under	<i>mespitiella</i>	
Cherry, Dwarf or Red (<i>Prunus cerasus</i>) and its cultivated (sweet) varieties	Under	<i>cerasicolella</i>	
Cherry, Wild (<i>Prunus avium</i>) and the Mor- ella Cherry	Under	<i>cerasicolella</i>	

Plant.	Surface of leaf or other situation.	Species.	Notes.
Chestnut, Sweet (<i>Cas- tanea sativa</i>)	Under	<i>messaniella</i>	
Clovers (<i>Trifolium</i> spp.)	Under	<i>insignitella</i>	
Elm (<i>Ulmus campestris</i>)	Under	<i>nigrescentella</i>	
	Under	<i>schreberella</i>	
	Under	<i>tristrigella</i>	
Furze (<i>Ulex europaeus</i>)	Under bark of shoots	<i>ulicicolella</i>	
Gean	—	—	See Cherry, Wild.
Goat Willow	—	—	See Sallow, Great.
Gorse	—	—	See Furze.
Guelder Rose (<i>Viburnum opulus</i>)	Under	<i>lantanella</i>	Often several in one leaf.
Hawthorn (<i>Crataegus oxyacantha</i>)	Upper	<i>corytifoliella</i>	
	Under	<i>oxyacanthae</i>	
Hazel (<i>Corylus avellana</i>)	Upper	<i>coryti</i>	Several in one leaf.
	Upper	<i>corytifoliella</i>	
	Under	<i>nicelli</i>	Several in one leaf.
Holm-oak	—	—	See Oak, Ever- green.
Honeysuckle (<i>Lonicera periclymenum</i>)	Under	<i>trifasciella</i>	
	Under	<i>emberizipennella</i>	
Hornbeam (<i>Carpinus betulus</i>)	Upper	<i>carpinicolella</i>	
	Under	<i>messaniella</i>	Sometimes.
	Under	<i>tenella</i>	
Maple (<i>Acer campestre</i>)	Under	<i>sylvella</i>	
Medick (<i>Medicago</i> spp.)	Under	<i>nigrescentella</i>	
Mountain Ash (<i>Pyrus aucuparia</i>)	Upper	<i>corytifoliella</i>	
	Under	<i>lantanella</i>	
	Under	<i>mespilella</i>	
	Under	<i>sorbi</i>	
Oak (<i>Quercus robur</i> , etc.)	Under	<i>amyotella</i>	
	Under	<i>cramerella</i>	
	Under	<i>distentella</i>	
	Under	<i>heegeriella</i>	In lobes.
	Under	<i>hortella</i>	
	Under	<i>lantella</i>	In <i>Q. sessiliflora</i> , preferring seed- lings and low bushes.
	Under	<i>messaniella</i>	
	Under	<i>quercifoliella</i>	
	Under	<i>roboris</i>	
Oak, Evergreen (<i>Quercus ilex</i>)	Under	<i>messaniella</i>	
Osier (<i>Salix viminalis</i>)	Under	<i>viminetorum</i>	
	Under	<i>viminiella</i>	
Pear (<i>Pyrus communis</i>)	Upper	<i>corytifoliella</i>	
	Under	<i>pyrivorella</i>	
Plum (<i>Prunus</i> spp.)	Under	<i>spinicolella</i>	
Poplar, Black (<i>Populus nigra</i>)	Under	<i>comparella</i>	
Poplar, White (<i>Populus alba</i>)	Under	<i>comparella</i>	

Plant.	Surface of leaf or other situation.	Species.	Notes.
Rest Harrow (<i>Ononis re- pens</i> and <i>O. spinosa</i>)	Under	<i>insignitella</i>	
Rowan	—	—	See Mountain Ash.
Sallow (<i>Salix</i> spp.)	—	—	See also Osier.
	Under	<i>salicicolella</i>	
	Under	<i>vimintella</i>	Usually near edge of leaf.
Sallow, Dwarf (<i>Salix repens</i>)	Under	<i>quinqueguttella</i>	
Sallow, Great (<i>Salix caprea</i>)	Under	<i>spinolella</i>	
Scabious, Lesser (<i>Scabi- osa columbaria</i>)	Under	<i>scabiosella</i>	Prefers seedlings and lower leaves.
Service (<i>Pyrus tormin- alis</i>)	Upper	<i>corylifoliella</i>	
	Under	<i>mespilella</i>	
Sloe	—	—	See Plum.
Sycamore (<i>Acer pseudo- platanus</i>)	Under	<i>geniculella</i>	Prefers upper leaves.
Vetch, Bush (<i>Vicia sepium</i>)	Under	<i>nigrescentella</i>	
Wayfaring Tree (<i>Vibur- num lantana</i>)	Under	<i>lantanellella</i>	Often several in one leaf.

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GREGARIOUS LARVAE.

By the Rev. Canon T. G. EDWARDS, M.A., F.Z.S.

Read 12th February 1944.

The word "gregarious" is commonly used in its biological sense to describe the tendency of individuals of the same species to herd together, without necessarily any arrangement or division of labour. Such groupings are common among insects of many orders at various stages of their development, and range from the lowest kind of association to the fully-developed social organization found among the Hymenoptera and the Termites, with their elaborate economy of highly-specialized forms.

Social development of this latter kind is unknown in the Lepidoptera; and where the gregarious habit occurs it is confined to the larval stage; unless we are justified in applying the term to those migratory species which swarm from time to time and leave their breeding grounds for more distant pastures. But the migratory habit is a subject outside the limits of the present paper.

In the larval stage, the gregarious habit is the exception rather than the rule among Lepidoptera, and it occurs sporadically, being found among single unrelated species, or genera, in widely separated families. With one important exception, these remarks will be confined entirely to such British species as I have had some slight opportunity of observing or rearing. The exception is that of the continental species known as the Pine Processionary moth, *Thaumetopoea pinivora*, Tr., which I have studied rather closely in its native haunts in the neighbourhood of Bordeaux; and I have included it because it represents the most extreme development of the gregarious habit to be found among the Heterocera.

Among our native Lepidoptera, gregarious larvae are found mainly among those species which hatch out in the late summer or early autumn and hibernate through the winter months in webs among their food plant. The creation of the hibernaculum is a common task in which all the larvae take part and the inmates derive mutual warmth and protection from one another. In the majority of cases the larvae leave the hibernaculum when the warmer weather comes and scatter to lead an independent life. There are a few species, however, in which the web is enlarged to become a permanent home throughout the larval stage and the colony continues to function as a group, only scattering to feed and returning to the nest for rest. The most extreme case of this among our native Macro-lepidoptera is found in the Lachneid group, in the case of *Eriogaster lanestris*, L., which remains in the closest association even after pupation. Examples have been recorded of two or more larvae of *lanestris* pupating within a

single cocoon. In the colonies of this species which I have reared myself all the cocoons were formed very close together and in the immediate proximity of the web.

A tendency towards gregariousness is found among several of our British Rhopalocera, but mainly in the earlier stages of their larval existence. Among the Nymphalidae, *Nymphalis polychloros*, L., *N. io*, L., and, I believe, *N. antiopa*, L., are all gregarious in their earlier stages; but they never form a closely-woven hibernaculum. The genus *Melitaea*, Fabr., is particularly interesting among the Fritillaries, in that all three of our species are gregarious in their early stages and form a well-constructed hibernaculum in which they spend the Winter. A web of *aurinia*, Rott., was shown at one of our recent meetings. But the only one which I have succeeded in rearing is *athalia*, Rott. In this case the young larvae left their web after hibernation and continued to feed independently during their later stages, feeding on Cow-Wheat. The same habit has been observed in *cinxia*, L.

Among our native Pieridae, I believe *Aporia crataegi*, L. (now believed to be extinct) stands alone in the fact that it retains the gregarious habit throughout the larval stage.

Among our Micro-lepidoptera there are not very many British species which have adopted a gregarious habit. So far as I know, there are none among the Tortricina. The only "Pyræ" in really conspicuous webs which I have come across is *Nephopteryx gemistella*, Dup., on gorse, which I once found in abundance at Christchurch, Hants. My friend Mr H. W. Daltry tells me that he took *Acrobasis consociella*, Hb., in Blean Woods on scrub oak in what he describes as a web, though it is probable that the "web" in this case consisted of a compact mass of feeding tubes.

Among the Tineina there are certain genera among the Hyponomeutidae—notably *Hyponomeuta* itself—which are normally gregarious. The most familiar species is *Hyponomeuta cognatella*, Hubn., which makes large untidy webs on *Euonymus* in our gardens. The next genus, with one British species, is *Scythropia crataegella*, L., which also makes a loose web. There were several in a web which I saw on a small Hawthorn bush at Brockenhurst a few years ago. Larvae of the beautiful genus *Swammerdamia*, Hubn., are also partially gregarious and at least one species, *lutarea*, Haw., forms a hibernaculum.

Returning to the Macro-lepidoptera, there are very few British species among the moths which can be described as truly gregarious. I notice that Meyrick makes no reference to this habit in the case of *Orthosia* (*Taeniocampa*) *miniosa*, Schiff., which I attempted to rear without much success a few years ago from a small colony which I found feeding on soft "Oak Apples"—a rather unusual diet. Probably I allowed them to become too dry.

But the best examples of gregarious larvae found among our Heterocera are those of certain genera of the Lasiocampidae, more particularly those of the Lachneid group already referred to, in which the

three species, *Malacosoma neustria*, L., *M. castrensis*, L., and *Eriogaster lanestris*, L., are well known for their gregarious habits. The two former become more or less independent in their later stages, but *lanestris* has been described as being more truly gregarious than any other British species. Tutt (*British Lepidoptera*, vol. ii, p. 507) quotes Robson in saying: "The larvae spin a web and live gregariously until full grown and cannot be removed from the web with any certainty of rearing them." As a matter of fact, they often leave the web a few days before they are full fed, but they never wander very far from their original home and they normally pupate close together, as far as I can judge from my own observations, though rearing larvae in captivity tends to create artificial conditions from which it is dangerous to generalise.

I should like to conclude this paper with a brief note upon the continental species known as the Pine Processionary moth, *Thaumetopoea pinivora*, Tr., which I have examined and reared on more than one occasion. This species takes us a stage further in the gregarious habit which approximates to a rudimentary form of social organisation. The fullest account of the Natural History of this insect is found in Fabre (1898) *Souvenirs Entomologiques* (Ser. VI). It is unfortunate that this work, so delightful in literary style, often fails in accuracy of detail.

The moth lives on the *Pinus pinaster* of the Landes in S. France. The ova are deposited in cylindrical clusters on the young needles of the pine. They are firmly gummed together and covered with down from the anal tuft of the female. The eggs hatch in September and immediately the offspring of one batch construct a silken nest, weaving together several bunches of pine needles. As these needles form the scaffolding of the web, they are not eaten; the larvae feed at night on the surrounding foliage. The nest is gradually enlarged during the milder weather in the Autumn and Winter months, and on warm days in March and early April the colony emerges from time to time during the hours of daylight, travelling in procession of Indian-file in head-to-tail contact and laying down a broad ribbon of silk as they proceed, which serves as a guide for the return journey in the evening. I have met processions of as many as two hundred and sixty-five larvae at once travelling over the sands round Arcachon. These excursions are not foraging expeditions. The larvae never feed in the sunshine. Nor are they just pupating journeys to find a suitable spot for burying, although the last procession of many terminates in this way.

The distance covered may be as much as two or three hundred yards, and the precise object of the journey remains obscure. Occasionally the procession breaks up for half-an-hour or more and adopts a resting position, which has been called the "circulating mass," in which the original order appears to be lost. I have experimented with large and small processions with a view to ascertaining the causes which lead to their being reformed and the degree of response which the larvae show to different kinds of stimuli. To this end I marked certain individuals

with powdered crayons of different colours. As the larva is hairy, this method of identification is fairly simple.

One curious result of these experiments was the tendency which they revealed for the procession to reform under the original leader in spite of a complete reshuffling of the remaining larvae. It is true that any larva can function as leader; and if No. 1 is removed No. 2 readily takes his place; but when the order is completely lost it is found that, when left to themselves, the larvae will often reform their line under their former leadership. This was true of 65% of some scores of experiments which I made. Others since have confirmed these results. The retention of the leader in so large a proportion of cases cannot be due to chance. It certainly suggests that we have here a very rudimentary attempt at differentiation of labour and, at least, some trace of individual initiative, or the power of adaptation to changing circumstances.

In the case of the formation of the "circulating mass"—which appears, I have said, to be a resting condition—and also in the task of pupation, it is always the leader who takes the initial step. Processions arranged artificially, by removing larvae at random from the mass and placing them in a position of head-to-tail contact along the thread, broke up again almost immediately and eventually the individual larvae formed themselves into a different order. In the act of pupating the whole procession forms a "circulating mass" which gradually causes a depression in the sand and eventually becomes buried to a depth of 3 or 4 inches. The larvae finally pupate after about 19 days.

To my own mind, these and other evidences of some kind of self-determination in insects are a strong argument for rejecting any purely mechanical theory of behaviour, which represents living organisms as mere automata, solely controlled by tropisms or stimuli. These, once popular, theories suffer from over-simplification. You cannot interpret life, in any form, solely by the laws which appear to govern the inorganic world.

The Processionary Moth offers a big field for further research and may throw some fresh light on the psychology of instinct; but in any case this remarkable insect marks a stage of social development far in advance of anything found among our native Lepidoptera possessing gregarious larvae.

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MUSHROOMS AND TOADSTOOLS.

By W. H. SPREADBURY.

Read 11th March 1944.

Fungi differ from other plants in that they have no chlorophyll. They are consequently unable to manufacture food from the simple chemical substances of earth, air and water; and are dependent on the products of green plants and of animals for their existence.

As saprophytes (living on dead organic matter) they are important agents in the disintegration of plant and animal remains: and as parasites they cause disease in many living creatures.

Economically many fungi are of great importance. They may assist man in industry, supply him with food, attack his animals and crops (and even himself): and attack and destroy his stores, including the home in which he lives.

What is commonly called the toadstool or mushroom is only a part of the actual plant—the fruiting portion or sporophore. It is the outward and visible sign of the corruption within.

The actual plant is within the wood, dung, dead leaves, etc., on which it feeds, and consists of tiny threads which when massed together form fluffy strings ramifying through the nutrient matrix. This mycelium or “spawn” we find abundantly where conditions are favourable and except for a few species no one pretends to be able to separate the various species by this alone.

To identify our fungi we examine the sporophore.

Most of the larger fungi belong to two classes, the Basidiomycetes and the Ascomycetes.

Let us deal with the Basidiomycetes first. In this extensive class the hymenium or tissue which bears the spores is covered with microscopic club-shaped processes. Some, the cystidia, are barren and in certain species may be produced into fine glistening points. Others, the basidia, have grouped on the summit of each club spores (generally four) each attached by a minute stalk.

These spores are shed, when ripe, in a way that is not definitely understood and the total number of spores from one sporophore may reach six figures.

The hymenium may be exposed from the start and may cover the whole or some specially adapted part of the sporophore; or it may be enclosed in a peridium which opens only when the spores are ripe and freed from the basidia.

Here is a basis for classification then, and for the identifying of various species we must depend on careful observation of the physical characteristics of the sporophore, including the colour of the spores when seen *en masse*.

CLASS I.—BASIDIOMYCETES.

Order I.—*Hymenomycetes*, having the hymenium superficial and exposed from the start or soon after.

Family 1. Agaricaceæ:—In these the hymenium covers a series of plates (gills) often protected by being on the underside of a cap. This family includes a great many species more or less resembling the common mushroom—far too many to deal with even briefly in a short talk. Such genera as *Amanita*, *Lepiota*, *Mycena*, *Pholiota*, *Paxillus*, *Hypholoma*, *Coprinus* (with deliquescent gills), and *Psalliota*, the edible mushroom group, are commonly met with.

Family 2. Polyporaceæ:—Many of these resemble the previous family in appearance but all have instead of plates numerous pores or tubes lined with hymenium. *Boletus* includes some good edibles and *Polyporus* is abundantly represented in the bracket toadstools, while in *Dadalea* the tubes are flattened so that the walls appear like twisted “gills.”

Family 3. Hydnaceæ:—In these the hymenium covers a series of spine-like projections. *Hydnum* is the typical genus: *Irpe*x forms crusts on fallen branches; while in *Phlebia* the spines are little more than radiating pimply lines.

Family 4. Thelephoraceæ:—*Stereum*, *Thelephora* and *Craterellus* are common genera, and in all these the hymenium covers the more or less wrinkled surface of the underside of the sporophore.

Family 5. Clavariaceæ:—The hymenium covers the whole sporophore, which consists of simple clubs or branched spindly masses. *Sparassis crispa* resembles a good-sized bath-sponge and is edible.

Family 6. Tremellinaceæ:—These form more or less gelatinous masses with the hymenium confined to the underside. *Tremella mesenterica*, *Hirneola auricula-judæ* and *Exidia glandulosa* are common examples.

Order II.—*Gasteromycetes*, have the hymenium completely enclosed in a peridium which, except in the underground species, opens when the spores are matured.

Family 1. Phalloidaceæ, includes *Ithyphallus impudicus*, the well-known Stinkhorn whose spores are carried by flies and carrion-feeding insects. *Mutinus caninus* is a small species without the very objectionable smell.

Family 2. Lycoperdaceæ:—In these the peridium consists of two or more layers. Puffballs and Earthstars are sufficiently abundant to have English names. The spores escape from an opening at the top and are discharged when leaves, twigs, etc., are blown against the fungus.

Family 3. Sclerodermaceæ:—*Scleroderma vulgare*—the Earth ball—resembles a coarse-skinned puffball, but, instead of discharging its spores by a definite opening, splits irregularly. The spores are then washed out by rain.

Family 4. Nidulariaceæ:—These tiny “birds’-nest fungi” resemble little cups filled with disc-like packets of spores. *Sphaerobolus stellatus*

is even smaller and occurs in masses on rotting wood. It discharges a tiny ball of spores many feet.

Family 5. Hymenogasteraceæ are subterranean fungi superficially resembling truffles.

CLASS II.—ASCOMYCETES.

Only a comparative few of this very large class are to be numbered amongst our larger fungi. In all of them the spores, usually eight in number, are contained in long thin cells called asci. Many hundreds of these cells interspersed with thread-like structures called paraphyses cover some part of the sporophore.

SUB-CLASS I.—DISCOMYCETES.

Many of these are saucer-shaped, the asci and paraphyses lining the inside. From time to time a shower of spores is discharged, sometimes conspicuous as a ghostly cloud leaving the fungus. Species of such genera as *Peziza* and *Acetabulum* are commonly met with and are cup-like and often several inches across. *Bulgaria inquinans* resembles a blackish gelatinous button, while the *Geoglossums* resemble small blackish unbranched *Clavarias*. *Helvella crispa* and *Morchella esculenta* are edible and, being stalked with the spore-bearing portion at the top, are superficially quite unlike the typical Discomycetes.

SUB-CLASS II.—PYRENOAMYCETES.

In these the asci line tiny flask-shaped pockets in the surface of the body of the fungus. The entrances to these pockets (perithecia) are just discernible with the naked eye. *Daldinia concentrica* and *Xylaria hypoxylon* are well known and conspicuous examples. *Cordyceps militaris* is a common parasite on subterranean larvae and pupæ; but the majority of the Pyrenomycetes are very small and require a good pocket lens for their examination.

SUB-CLASS III.—TUBERACEÆ.

The truffles are familiar enough to everyone by name but few people are acquainted with them in the field. They are subterranean fungi and the asci develop inside the ball-like fungus mass. Many have a curious smell attractive to rodents and pigs, which dig them up and devour them, thus scattering the spores which apparently pass unharmed through their bodies.

With these we must end our review of the larger fungi. But it would not be fair to close without a bare mention of the innumerable moulds, mildews, rusts and smuts, many of which are of vital importance in the economic life of man.

NOTES ON SOUTH AFRICAN GALLS.

By M. NIBLETT.

Read 8th June, 1944.

The following notes on South African Galls are not compiled from personal observations, but chiefly from data supplied to me by an entomologist, Mr H. K. Munro, residing in South Africa, with whom I have corresponded. Various families of plants are attacked by gall-causers belonging to several Orders, to a few of which only I can refer.

The Eriophyidae (Gall Mites) are the cause of numerous galls: *Eriophyes dichrostachia*, Tuck., and *E. mallyi*, Tuck., form galls upon the leaves of *Dichrostachys mutans* (Leguminosae) and *Vangueria infausta* (Rubiaceae) respectively. *E. diceyi*, Tuck., is a species found under the scales of dormant oak-buds; it has been found in March and August. *E. hexensis*, Tuck., occurs on *Rhus* and causes deformation of young shoots, and open cup-shaped galls on the leaves. Another species, *E. merwei*, Tuck., found in buds of sugar-cane, causes considerable damage and dwarfing of growth.

The mites to which I have just referred are of moderate size, averaging about 200 μ in length with from 75 to 80 rings on the body.

Many of the South African galls are believed to be caused by gall-midges but little appears to be known of the adult stage of the gall-causers, Cecidomyiidae being apparently difficult to rear from galls in that country.

One species, *Afrodiplosis tarchonanthi*, Felt, causes the formation of fusiform swellings 10 to 15 mm. in diameter and 20 to 30 mm. in length, at the end of twigs of a Composite plant, *Tarchonanthus camphoratus*. They are surmounted by the terminal leaves of the undeveloped twig and bear several leaves on the sides; the gall is covered with a dense mass of whitish pubescence. These galls when young are soft and succulent but become tough and woody when mature. In the centre of the gall is the larval chamber open at the distal end, and having a tubular opening protected by a dense mass of hairs; there are two generations a year and the galls mature very rapidly. They may contain from 1 to 7 larvae but the number does not appear to affect the size of the gall in any way, they all being of an average size. The larvae pupate in the gall, where the pupal skin remains, the adult midge after emergence forcing its way through the guard hairs at the mouth of the orifice. Although so well protected, the larvae are heavily parasitized by a minute Hymenopteron. I shall refer to an interesting point in connection with these galls later. Another midge-gall, that of *Asphondylia africana*, Felt, upon one of the Vitaceae, *Cissus cuneifolia*, may be either simple or compound. The simple galls are pyriform in shape and vary in size from 6 to 8 mm. in diameter, and

from 15 to 25 mm. in length; the base is globose, while the apex is produced into an elongate, curved, tapering point, ending bluntly, generally with the tip curved over sharply. The larva occupies a small cavity in the base of the gall; these are soft and succulent and eventually shrivel up and drop off the plant. The compound galls are somewhat similar but vary in diameter according to the number of larvae they contain; each larva occupies a separate cell in which it pupates; the pupae are armed with numerous heavy spines and bore their way through the soft walls when the adult midge is due to emerge, the empty pupal skins being left projecting from the openings much in the same manner as those of our species, *Rhabdophaga salicis*, Shrck., from its gall upon *Salix*. The galls are green at first, as are the berries of the host-plant, which when they ripen turn purple; the simple galls are frequently situated among the berries and change colour at the same time in a similar manner.

On *Dalbergia obovata* (Leguminosae) some interesting urn-shaped galls have been found. These are caused by a large black Cecid, species undetermined. Flower-buds of *Senecio angulatus* (Compositae) considerably swollen and failing to open are thought to be the work of another Cecidomyiid.

There are many species of the dipterous family Trypetidae to be found in South Africa, belonging to numerous genera peculiar to the country, or which are confined to tropical or sub-tropical areas; but there are certain genera represented which occur also in the Palaearctic Region. A fair percentage of these flies are gall-causers and, as in other regions, are found using the Compositae largely as their host-plants.

Afreutreta frauenfeldi, Schin., known as The Inquiline Gall-fly, is an extremely interesting species; its larvae are found in the galls of the Cecidomyiid *Afrodiplosis tarchonanthi* to which I recently referred. The Trypetid larvae are found in young and still succulent galls, the walls of which they consume; they do not interfere actively with the rightful owner, but if the gall is eaten to a large extent the midge larva dies. The Trypetid larvae pupate in the remains of the gall. In certain parts of the country no galls made by the Trypetid larvae alone were to be found, but elsewhere, where the Cecidomyiid did not seem to occur, the Trypetid was bred from insignificant swellings on the ends of succulent twigs of the same host-plant, *Tarchonanthus camphoratus*. This species was recorded by Schiner in 1868 and apparently was not recorded again until 1926. *Afreutreta bipunctata*, Lw., is the cause of large and often woody galls upon the stems of *Brachylaena discolor* (Compositae). The galls are usually situated towards the end of a twig but are seldom terminal; there is usually several inches of healthy twig beyond and one or two normal-sized leaves on the gall. The gall is of a rather elongate spindle-shape from 7 to 20 mm. in length. Prior to pupation the larva prepares an exit for the fly to emerge from the gall by scraping a hole in the wall, only a thin layer of epidermis being left.

The larvae of *Afreutreta discoidalis*, Bez., inhabit galls on the stems of *Vernonia anisochaetoides* (Compositae). The galls are at first soft and succulent, later becoming hard and woody; they vary considerably in size, ranging from 15 to 25 mm. in length, and are more or less elongated and often irregular in shape. Near the top is the exit prepared by the larva; the thin outer skin of the stem is left and it appears externally as a brownish spot. The parent fly deposits her egg in a young growing stem; upon emergence the larva burrows into the pith, working downwards; from time to time the upper portion of the cavity is shut off by a small plug. Eventually, probably on reaching some definite period in its development, the larva ceases to travel downwards and remains in one place, usually opposite a leaf. Up to this period there has been only a moderate swelling to indicate the presence of the larva in the stem; the gall now develops rapidly and soon attains its full growth; there are two generations a year and the larvae appear to be heavily parasitized.

Parafreutreta (Acronneus) bryanti, Mro., larvae inhabit galls in the stems of *Senecio longiflora* (Compositae). These galls vary very much in size and may reach 1 cm. in diameter and 4 cm. in length; there are always two or three larvae in a gall. *Parafreutreta conferta*, Bez., causes galls upon the stems of *Senecio angulatus*. These enlargements of the stem are more or less pyriform, but are often very irregular; within the gall cavity there may be from one to seven larvae, most commonly five or six. Before pupation a single exit is prepared, the thin membrane left covering it appearing as a white spot on the outer surface of the gall; there are two generations a year.

Galls formed by the larvae of *Acanthiophilus hemimelas*, Bez., are found on the twigs of *Brachylaena rotundata* (Compositae); they are rather small and inconspicuous. They seem to be made for preference on the young developing inflorescences. The flies emerge in August after a very short pupal period. *Acanthiophilus muiri*, Bez., also affects the stems of a *Brachyleana*, usually *B. elliptica*; the galls are always terminal and there is seldom any growth on the twig beyond them. The galls vary in size and appearance; if formed on an older twig they may be globose or pyriform in shape and conspicuous, bearing a few stunted leaves. If on young tender twigs the galls are at times almost invisible, being embedded in the twig, while the leaves are better developed; the infested twig may be distinguished by some thickening and by the terminal leaves being closer together than they are upon a twig not galled. The adult flies emerge in March and April.

Trypanea lignoptera, Mro., causes terminal galls on the twigs of *Berkheya magaliesmontana* (Compositae); no very definite gall is formed, but there is a thickening of the fleshy tips and a shortening of the twigs. *Spathulina péringueyi*, Bez., larvae are the cause of small, inconspicuous galls at the tips of twigs of *Elytropappus rhinocerotis* (Compositae) and until 1931 this gall was known only from the unique type in the South African Museum.

It is interesting to note that *Sphenella marginata*, Fln., which is not uncommon in Britain, occurs in S. Africa, the larvae inhabiting the flower-heads of *Senecio ruderalis*, *S. diodon* and *S. concolor*; only one larva is found in each head in which respect they differ from those occurring here, there usually being several larvae in the flower-heads of our species of *Senecio*. The S. African form constructs a large cocoon ("Nest" is the local name given to it) composed of the remains of seeds, pappus-hairs and excrement glued together. This cocoon or nest fills the whole of the flower, and when the flower dries the bracts turn back, the nest remaining attached to the base. In 1936 Mr Munro wrote to the effect that he had found a few flower-heads of *Senecio orbicularis* which were swollen to about three times their normal size, and that there were two to four puparia of *Sphenella marginata* in each, instead of the usual one. *Sphenella melanostigma*, Bez., larvae feed in the flower-heads of *Senecio latifolius*, which sometimes do not open and have the appearance of an enlarged bud; in this species the larvae consume the interior of the flower but do not construct the "nest" for the pupa, which seems peculiar to *S. marginata* only.

A rather uncommon species, *Campiglossa perspicillata*, Bez., is the cause of very inconspicuous terminal galls on *Helichrysum cymosum* (Compositae).

The larvae of *Odeaspis* (*Tylaspis*) *maraisi*, Mro., form spherical galls on *Othonna pallens* (Compositae). The galls are formed close to the stem from young side-shoots which seldom grow any further; the leaves develop as a tuft on the top of the gall, with usually a few on the sides; occasionally the shoot grows a short distance beyond the gall. The galls are spherical, green and succulent; in a longitudinal section the larva or puparium is found in a curved chamber that extends from one side to the other across the lower half, the upper half of the gall being filled with a peculiar soft, spongy tissue. At one end of the chamber the larva makes an exit, leaving the thin outer skin as a covering.

A considerable enlargement of the stems of *Solanum incanum* (Solanaceae) is caused by the larvae of a moth, *Gelechia bletrias*, Meyr.

The larvae of a Coleopteron, *Alcides erythropterus*, Chev. (Curculionidae), known as the Bean Stem Gall Weevil, causes swellings on the stems of Beans.

Rhoophilus loewi, Mayr, a Cynipid, was described by Mayr in 1881 and recorded as being the cause of a spherical gall on the leaves of *Rhus lucidum*.

I was interested to find that although the South African entomologists are chiefly concerned with the economic aspects of entomology, they appear to pay some attention to the galls of the country, whatever group of insects they may specialize in.

As I stated in my opening remarks, I claim no originality for these notes but thought some information about galls of a country with a climate and flora so different from ours might prove of some interest.

“ RED LETTER DAYS.”

By Colonel P. A. CARDEW.

Read 10th August 1944.

I hope it will be generally agreed that in giving a talk of this nature it is practically impossible to avoid being auto-biographical. Before I plunge in I should like to express my great regret at not being in a position to exhibit to you the various specimens to which I shall refer in my talk. I feel that this would have added at least some interest to what will, I fear, prove a rather humdrum tale. The fact is that all the Red-Letter Days which I propose to talk about occurred more than 30 years ago—beginner's luck if you like—but I rather suspect beginner's superior energy and enthusiasm. As one gets older one is too often inclined to say: “ Oh, its only so-and-so,” and let the insect go without examination, whereas when “ all is fish ” the occasional rarity does not escape. Anyhow, during the 1914-18 war circumstances compelled me to sell my collection. I was on service overseas continuously from August 1914 till June 1921. My wife had three small children to cope with; we had no settled home, and she spent the whole war living either with relatives or in other people's furnished houses; so that I did not think it fair to load her still further with the care of cabinets full of insects, and I very reluctantly told Stevens to sell.

To start on the first of my “ Red-Letter Days ” I must take you back more than 50 years—in fact, to July 1893, an exceptionally hot and early season. I was at the time a pupil at a private school at Southbourne between Bournemouth and Christchurch. Those of you familiar with this neighbourhood to-day know Southbourne as a sort of suburb of Boscombe and Bournemouth, a continuous built-up area extending nearly to Christchurch—but 50 years ago there were very few houses there; in fact, so much in the country were we that, in the summer term, we used to run across the common to the low cliffs and down a path onto the beach and bathe as Nature made us, masters and all, a proceeding which would, I am sure, be severely repressed by the local Watch Committee if the present generation of Pembroke Lodge boys were to try it on.

The school was kept by a man named Cornish, who was a fanatic on the subject of cricket—in fact, he very much resembled the type of master depicted in “ Punch ” of the period as saying to the new boy: “ Of course, Smith minor, you need not **WORK**, but **PLAY** you must and shall!” He was, however, quite sufficiently broad-minded to encourage any signs of an interest in natural history—especially entomology—evinced by his pupils and we were given facilities for collecting, breeding, etc. As I have said, Southbourne was right in the country, but even then the place was evidently considered “ ripe for development,” and some mystic agency had caused gravel roads to be cut at right angles across the com-

mon land between the school and the sea, and had planted young poplars along them, which yielded us a rich harvest in the early stages of Puss Moth, Kitten and Poplar Hawk.

Twice during the summer term we made forays in pair-horse brakes into the New Forest. The first occasion was an annual cricket match against a rival school kept by a man named Rawnsley, and therefore only affected the school XI plus a few scorers, etc. "Rawnsleys" was situated in no less a locality than the Park Hill enclosure, Lyndhurst, so that I need hardly say that quite 80% of the Rawnsley boys were keen bug-hunters—surrounded as they were by *paphia*, *adippe*, *camilla*, and even legends of *iris*. Our XI was always loaded with large numbers of larvae off our poplars for which the Rawnsley boys gladly exchanged fresh-caught *camilla* and large fritillaries, which to us were pearls of great price—in fact, almost more interest was taken in the result of the "swapping" than in that of the match, which ought to have been—and generally was—a certainty for us. We had very good playing grounds, with a pitch rolled and watered within an inch of its life, and masters to coach us specially chosen for their cricketing abilities, whereas the only field the unfortunate Rawnsley boys had consisted of a clearing in the Forest, the pitch being a pony track—and most dangerous with anything like a fast bowler.

The second expedition into the Forest took the form of a picnic for the whole school, and early in July 1893 we sallied forth as usual to a favoured spot near Picket Post, where, after a large meal washed down with lots of ginger pop, the bug-hunters were let loose with nets and killing bottles to work their wicked will upon the local lepidoptera. I remember that we were very disappointed at the ragged remnants of *camilla* and male *paphia*, which were all that we could find, but I got a few fairly respectable female *paphia* and some smaller fry after much hard work, and the next day set about the arduous task of setting my catch. I then noticed that one of my *paphia* looked as though someone had been trying to be funny with it by sticking on a left forewing of a totally different colour—the upper third of the left hindwing being also of this brighter orange-brown shade—the rest of the wings being dull olive-brown.

Fortunately, there happened then to be staying with our headmaster a man whose name I have forgotten, but who was a close friend of no less a personage than Charles G. Barrett, then the "Big Noise" in the entomological world, and he undertook to show the specimen to the great man. It was, of course, a partial gynandromorph, and Barrett wrote me several letters about it and exhibited it before the Entomological Society in November of that year (1893). From Barrett's letters it would appear that one great point of interest in the specimen lay in the fact that the line of demarcation between the sexual colours did not lie along a nervure but cut through the area between two nervures.

For my second purple patch I must pass over 14 years during which I went to Wellington and so to Woolwich, neither of which were conducive

to much collecting, though I always retained my early interest. Thence I passed into the Gunners and out to the S. African War. My battery was eventually sent to Bermuda as part escort to some 1300 Boer prisoners, and, after spending two years there and two years in Canada, in which country I was one of the last "Regular" soldiers to serve, I came home early in 1905 to do what was called the Ordnance Course, with a view to transfer to the Ordnance Corps, as a necessary prelude to matrimony. During this twelve-month course, in the summer of 1905 occurred what seemed to me at the time a "Red-Letter Day," but which proved to be what is vulgarly known as a "sell." I was on leave staying with my parents, who then had a house at Woking, and coming down to breakfast one morning I noticed on one of the passage windows a Noctuid moth which I did not recognise, though I had a shrewd idea of the genus to which it belonged. A hasty search through my battered copy of Edward Newman convinced me that it was not a British species. Greatly excited, I got the moth into a matchbox, and dashed up to S. Kensington by the next train. There I was kindly but firmly told that I was several years behind the times. The insect was *Plusia moneta*, Fb., and it had by then spread over most of southern England.

Early in 1906, having acquired a wife, I received my first Ordnance appointment at Dover, where I took a house, bought a cabinet and Tutt's *Practical Hints*, and settled down to collect in earnest. About the middle of May 1907—another early and hot season—I was sugaring in a wood in what we used to call Poulton Valley—Poulton Farm being the principal habitation therein. The valley runs roughly East and West just North of the Dover-Folkestone road—on its north side are the ruins of St Radigund's Abbey. It was a quiet night and insects were plentiful. I saw a pair of grey moths, which at first I did not recognise, *in cop.* on the sugar. I successfully got them into a large box and, on examining them felt pretty sure that they were *Acronycta auricoma*. Now, of this species I had the little knowledge which is proverbially so dangerous, and which, in this case, ended in my committing an entomological crime of the first magnitude. I knew that it was uncommon—(was it not called the "Scarce Dagger?"). I knew that it was double-brooded and that, therefore, a quick reward awaited me if I could get ova. I knew that one principal foodplant was ordinary bramble. What I did not know was that no one had taken the species in Britain for at least thirty years before that date, and that no one was going to take it again until Baron de Worms got one at sugar not many miles away thirty years afterwards. If I had known what a prize I had the tragedy might have been averted. As it was, I picked off a few bramble leaves and made for home. When I got back I found that the insects had separated and were buzzing frantically round the box. Puzzle—which was the female? Solution—Put them both into the cage prepared with the bramble leaves. Then, as they still frantically battered themselves to pieces, I became obsessed by the proverb about "birds in the hand," and, to cut a long story short, I KILLED BOTH!

I need hardly say that I have never ceased to bow my head in shame when I think of what I did that night. They say that confession is good, and my soul already feels the benefit of this one, but how I came to be such a complete ass I cannot now conceive. Incidentally, having killed and set the specimens, I showed them to the late Mr Sidney Webb, the well known entomologist, who was then living in Dover, and he at once confirmed that they were indeed *auricoma*. Let us now draw a veil over this terrible blot on my escutcheon and proceed to number three "Red-Letter Day," which occurred three months later—in August 1907.

I was sugaring on the Deal sandhills in company with a younger brother who, not an entomologist, was there simply to see the sport and lend a hand when necessary. In those days the difficulty was to find anything suitable on the golf-course on which to smear the sugar, but we had managed to find a few old gates and mooring-posts and were enjoying grand sport—swarms of moths on every patch. I was kneeling to examine the visitors on a small post when my brother, who had stepped round behind the post with his light said: "Here—what's this?" I peered round the post and saw what appeared to be a female *Agrotis puta*, so I replied: "Not wanted—only *puta*." However, he persisted, saying I had better have a good look at it, as it looked weird to him, so to please him I reluctantly got up and had one look at the insect. Within an instant I had it in a box. It was a most perfect gynandromorph—and particularly striking in this insect, as you can imagine, owing to the very marked sexual dimorphism.

Since those days I have had many other days which were "Red-Letter" to me, as, for instance, when strolling along the outskirts of a wood in S. Hampshire I kicked up what looked like an enormous Crambid and proved to be a fine male *Acosmetia caliginosa*. This discovery enabled me to furnish Dr Cockayne and Mr Hawkins with the necessary material for the badly-needed description of the early stages of this rather obscure insect, which appeared subsequently in *The Entomologist*. Then there was the capture of *camilla* ab. *nigrina*, two specimens off the same bramble bush—I had almost said the same flower—a week apart, and the rescue of a beautiful ab. *nigra* of *Aglais urticae*, from our sitting-room window in Horsham after my wife had made three determined efforts to "let the poor thing go"—but I feel that I have bored you long enough with my rambling reminiscences, and will therefore conclude by thanking you for the very kind way in which you have listened to my yarn and by wishing all members of the South London many "Red-Letter Days" in their future collecting.

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MONK'S WOOD, HUNTS, AND ITS ENVIRONMENT: PAST AND PRESENT.

By H. A. LEEDS.

With a sketch map.

Read 14th September 1944.

Monk's Wood derived its name from the monks who owned it and lived at Sawtry Abbey prior to the reign of Henry VIII. Some idea of the imposing size of the Abbey can be gathered from traces of its foundation layout in a field of Abbey Farm situated to the north of Wood Walton Lane, which is now a major road $2\frac{1}{2}$ miles long connecting the Great North Road from Sawtry with the Alconbury Hill-Abbots Ripton Road at a point two fields away from Monk's and Bevil's Woods. Historically the wood is but a 400 acres remnant of the huge area of old forests which for countless centuries covered the clay uplands and dipped down into the fens of Wood Walton and what was formerly Whittlesea Mere.

Whittlesea Mere is where, rather less than 100 years ago, drainage and burning completely exterminated the Large Copper Butterfly, *Lycaena dispar*, Haw. About 50 years ago I more than once conversed with an old man who, as a boy, several times escorted collectors from Wood Walton to the fen to catch *dispar*, both sexes of which he could fairly well describe, and he told me that "not many were taken in a day." Afterwards I searched this and Holme Fen in the hope that they might still be occurring in some obscure part, but in vain. Hundreds of bog oaks are buried in this peaty soil, which, owing to its lightness, is blown away by strong gales, and the oak trunks, some of which exceed 60 feet in length, are extracted and provide good fuel for household fires. This continued removal lowers the surface of the fen, so that it is now some 14 feet below sea level. The rise in elevation to the highest part of Monk's Wood, situated at its south-eastern corner, is about 200 feet.

This high part prior to 1916 contained about $4\frac{1}{2}$ acres of well-formed and trunked beech trees and some species of moths usual to such trees occurred there. They were felled before 1918, as were all the trees along the adjacent portion of Monk's Wood which faces the Alconbury Hill-Abbots Ripton Road. A full-length strip of this face containing about 12 acres was purchased by Major Stuart Maples about 1920, and he erected and resided in a bungalow thereon. He collected lepidoptera during a stay of some years. Apart from a small garden he allowed any natural bush and tree regrowth to develop. It still remains wild, but is in separate ownership from Monk's Wood.

Bevil's Wood, of about 100 acres, is opposite, and the Alconbury Hill-Abbots Ripton Road, passing sinuously between the two woods with a

few oaks distributed on the grass verges, is very picturesque. Butterflies frequent this roadway; the oak trunks still retain the stains of sugarings prior to the 1939 war. A long series of woods extend southwards from Bevil's Wood and, like it, are owned by Lord de Ramsey.

Along the southern face of the wood as it now stands, a full-length riding is mainly blocked by blackthorns and other bushes. A good farm cart track, however, runs parallel with most of this southern side of the wood and only the hedge divides it from the grown-up riding.

Continuing round the outside of the wood, we find that its western side is straight, all the rest being irregular in outline. There it is bounded by the only remaining grassfield, which rises steeply from north to south. The main riding in the wood ends at a gate near the top, but no pathway continues across the field, though a stile nearby on the left affords access to the southern cart track just mentioned. Other woods are situated away from the west and north-west of Monk's Wood. Across a field, now ploughed, from the north-west corner is a wood of oak, elm and ash. This is only divided by a grass driveway from Odd Corner Wood, which contains coniferae and somewhat dwarfed oaks. It adjoins the Great North Road, beyond which on its opposite (west) side are Upton, Archer's and Aversley Woods, the last being nearest to Sawtry.

At the Wood's extreme north-east corner is the small West Wood, opposite the end of which a road branches eastwards from the "Lane" and leads to Wood Walton (Green End) about half-a-mile away. West Wood, then owned by Colonel Mowbray, was not despoiled during the 1914-18 war. It is now in the same ownership as Monk's Wood. About a mile from West Wood, between Wood Walton (Green End) and the fen, are two fair-sized woods—Riddy, and, two fields east of it, Gamsey Wood; their situation and wild environs (now cleared) were most promising for moths, but I could never find time to work them.

Within the Wood, the ridings are still situated as they were when I first visited it. Except for the one on the southern edge already mentioned, all the other ridings are still usable, although some are narrowed by intrusion of growth. A few oblique or transverse pathways and narrow cuttings into the wood vary in condition and obstructions. Turning now into the wood from Wood Walton Lane, opposite the road to Wood Walton a cindered cartway across a field by the side of West Wood gives access to the main riding. On our left is a riding leading up to a gateway adjoining the Alconbury Hill-Abbots Ripton Road. On our right a riding divides West Wood from Monk's and reaches the north-east gate, giving an outlet to Wood Walton Lane. The riding, however, continues inside the hedge to the next cross riding. Ignoring these, we take a few paces to the right, past some bushes, and a magnificent portion of the main riding is seen extending westwards almost straight and level for fully a mile. Travelling along it, we pass a cross riding and continue to the next. We have passed a clearing, on our

right, which is cultivated but is hidden by a belt of trees and bushes. On our left in the corner of the cross riding is an old wooden hut known as "Fox Hotel"; the name was painted on it but is now hardly readable. Formerly it provided shelter from a storm, but no refreshments; this year the door is padlocked. Continuing to pass along the main riding there is another clearing on the right which, like the previous one, was ploughed and set with potatoes in July last year (1943). Both crops totally failed and this year the land is being limed and drained. These two cleared portions contain about 30 acres, of which the main portion was covered with impenetrable blackthorn and other bushes. The appearance of the ridings is very little altered, as a belt of many young oaks, etc., and bushes pleasingly remain. Further along, this second clearing is edged by a riding which does not continue on our opposite (left-hand) side, where quite 100 yards distant from the main riding was a notable place for *Strymon pruni*, L., known to me for several years prior to its destruction by Canadian lumbermen about 1918. It surprised me when first discovered, for there, right out in the wood, was a fine grass oval of about 50 yards in length, the centre of which contained some blackthorns and much privet. Blackthorns and privet grew on three of the outer sides and the only inlet was close to the north-eastern end. The remaining (south) side was backed by somewhat bushy, but fairly high, wild plums, to which *pruni* much resorted and on which the larvae fed. The grassy oval 4 to 5 yards wide provided a nice walk where aberrations could be sought in June. It was first found after the woodmen had made a large clearing, and as that grew up I kept a way open to reach it from the main riding, guided by seven large oak trees, but, when close to it, eventually had to push my way through a belt of young aspen trees. When clearing in the vicinity the woodmen had not touched this oval, but it ended by the lumbermen reaching and burning it just before *pruni* was due to emerge, much to my disappointment, as I was hoping the next week-end to box and take to other woods all the females obtainable. A previous short test had indicated that *pruni* larvae were most abundant on the wild plum that year.

Further along, the straight portion of the main riding ends at the last cross riding. Following the turning to the left we should reach a bungalow which is occasionally visited by Mr H. Neaverson, the owner of the wood; but, taking the second turning on the right side of this cross riding, we enter an uphill continuation of the main riding and finally arrive at its termination when reaching the grass field gate. Just before reaching this gate we see an old wooden bungalow under the trees on the right which was formerly occupied by a keeper. On our left we have passed close to a peculiar feature of the hillside, as for some distance it is indented by a deep wooded valley, at present screened from view by high growth of bushes by the side of the riding. At times a clearance is made and the view across the valley at different seasons is then very beautiful.

I mention here, for the benefit of those approaching from Alconbury Hill, that the chimneyed brick hut—now partly ruined—to be seen on the left about a mile along the Abbots Ripton road marks an alternative entrance to the wood. The hut is often referred to locally as “Old Saul,” because it was constructed from the house of a former keeper so called. Habitation ceased in 1891. It is approached by a nice grassy pathway which leads across the near end of a field. There is also a very rough cartway from the road to the wood at the further end of the same field, which leads, through a gate, directly down the grass riding to the “Fox Hotel” and the main riding.

During the walk through the wood, when looking along the cross ridings, it will have been noticed how level is the northern side of Monk's Wood whilst the southern side is steeply hilly. This hilly ridge extends eastwards for a considerable distance across country, and its northern slopes were extensively covered with flowery and rough grass fields, but all this land is now arable. Bushy places were extensive and these, combined with derelict fen, varied woods, rough fields, roadsides, and droveways, afforded unbounded scope for the collector. This countryside was not much affected by the 1914-18 war, but widespread destruction took place in Monk's Wood itself.

Prior to 1914, when owned by Lord Chesham, Monk's Wood was maintained in perfect condition. Woodmen were continuously employed and cleared 20 acres annually of brushwood, felled the mature trees and cut the serviceable ash poles, etc. For each large oak removed four saplings were planted. Thus the full circuit took 20 years, which routine preserved the flora and fauna. The older blackthorns with privet in the vicinity enticed *pruni*, whilst the clearing of brushwood allowed the wild violets to flourish and enticed the Fritillaries. All five species of Hairstreaks still occur in the wood. Its main trees were oak and ash, but there was a mixture of other trees, including birch, aspen, maple, elm, lime, sycamore, wild service, wild pear, wild plum, and the beech previously mentioned. Several coniferous trees were planted near the beech but always were blown down before reaching maturity. The undergrowth contained blackthorn, whitethorn, buckthorn, privet, dogwood, willow, hazel, crab-apple, wild rose, honeysuckle, snowberry, elder, way-faring tree, guelder rose, spindle (skewer-wood), traveller's joy (old man's beard), and various brambles. Two or three openings carpeted with sedges or grass were used for feeding pheasants. Several kinds of ferns occurred, but no bracken infests any of these woods to smother the low plants, although a few miles away bracken covers much of Holme Fen.

In the 1914-18 war, instead of employing English woodmen skilled to fell only serviceable timber, Canadian lumbermen arrived. At the Wood Walton end a railway was laid from the road, across the field and along the main riding; huge sawing machines and stationary engines for hauling the trunks by steel hawsers to the site were installed in the wood. The trees required were felled and trimmed, a small part near the trunks was cleared, and then in sections everything but the

trunks was burnt. The whole width of the wood was taken and by the end of that war more than half of its area was a desert of grey ashes, except for a narrow and long strip of bushes containing a few trees. Soon after that war severe culling of the remaining (western) part ensued. It appeared that this historic wood was doomed, but, fortunately, Mr H. Neaverson and his late brother purchased it, and, in addition, acquired some adjoining fields, together with the untouched West Wood. The latter has had only a few trees removed since, and an opening made where at one time some pigs were allowed to roam. This opening is adjacent to, but divided by a hedge from, the cindered cartway leading across the field from Wood Walton Lane to Monk's Wood.

It was surprising how bushes and trees began to grow naturally from the burnt portion of Monk's Wood. One or two woodmen were again employed, but less so since 1939. Some work is now being done by one woodman, and the regrowth, with some oaks and other trees attaining a fair size, especially in the western portion, once more entitles Monk's to rank as a wood. Its somewhat wild appearance gives an effect which is more picturesque than the stately grandeur prior to 1914. The most imposing part at that time was along the south face, where on either side of " Old Saul " were majestic oaks interspersed with hundreds of straight younger oaks towering above them. Here in July many *Apatura iris*, L., settled on the trees or gambolled around each other, ascending high into the air. Sometimes one male would descend swiftly and settle on the sun-heated tiles of the hut, or chase an *Argynnis paphia*, L., back and forth along the then wide and grassy front riding. Only rarely would one settle on the ground. The lumbermen destroyed these oaks and *iris* has almost disappeared since.

This was a good part for butterflies and moths and I had visited it for some years when one day a disturbed moth, which I was chasing, dodged about inside some high bushes not far from the brick hut. After several turnings it led me out to the back of the bushes, when I was surprised to see a rather wide and mossy pathway extending straight as an arrow down the hill between well-trunked and spaced oak trees. Travelling along it noiselessly, for not a stick was to be seen upon it, I eventually emerged, through another maze of bushes, close to the extreme end of the straight main riding. It was a secret pathway with masked entrance at either end, and it solved a matter that had several times puzzled me, when, after conversing with a keeper near the brick hut I had walked down this last cross riding and, looking along the main riding, saw the same keeper walking away some distance from me. How he got there so quickly without me seeing or hearing him was solved by discovering the mossy pathway running parallel with the cross riding.

Mr Neaverson's bungalow was built later and is situated on the side of this cross riding not far from the brick hut. Here were situated a fine lot of oaks for inside and outside sugaring. Sometimes the moths

would favour the inside, especially when windy, but no observation was made as to whether any species came to the inside only. A short interior sugaring route in Bevil's Wood also produced considerable success.

I found that moths came to sugar more consistently at the time when the lime trees were in flower than at any other time, but during that period I always sugared well away from limes, and here, in Hunts, at such time there never was the unaccountable failure of sugar which is associated with other periods. As everywhere, the hot, oppressive, still evening which presaged a thunderstorm brought swarms of moths to sugar, and I found to my cost that their sudden disappearance just before heavy rain began to fall gave too little warning for me to reach shelter.

Lepidoptera are mostly scarce in the wood at present, as the gales and frosts during the main larval period of the month of May caused much destruction both in 1943 and 1944, the present year, and fewer *pruni* were seen this June than for the previous eleven seasons. This species still has many blackthorn thickets in the wood and they are vital to its continuation as they provide some protection from frost. In moderately open situations I have many times found the larvae fatally frost bitten, hence clearing and planting should be gradual to preserve the flora and fauna of these old and unique Hunts woods. Their soil through countless centuries has proved its suitability for producing oak and other hardwood trees. These woods should be scheduled for preservation, but rows and rows of young coniferae will not mature, as most of the soil will only provide short root growth for them and they are readily blown down, even when sheltered by other trees.

Mr Neaverson deserves the gratitude of all entomologists for his success in so far saving Monk's Wood, and for allowing us to visit the wood on our lawful occasions. Permission must always be obtained in advance; no dogs may be taken into the wood; and a brief report of the results of our visits is appreciated.



1 epilobiella.

7 conturbatella

11 raschkiella.

2 terminella.

12 schrankella.

8 nodicolella gall.

3 propinquella.

13 ochraceella.

4 decorella.

14 lacteella.

9 decorella gall.

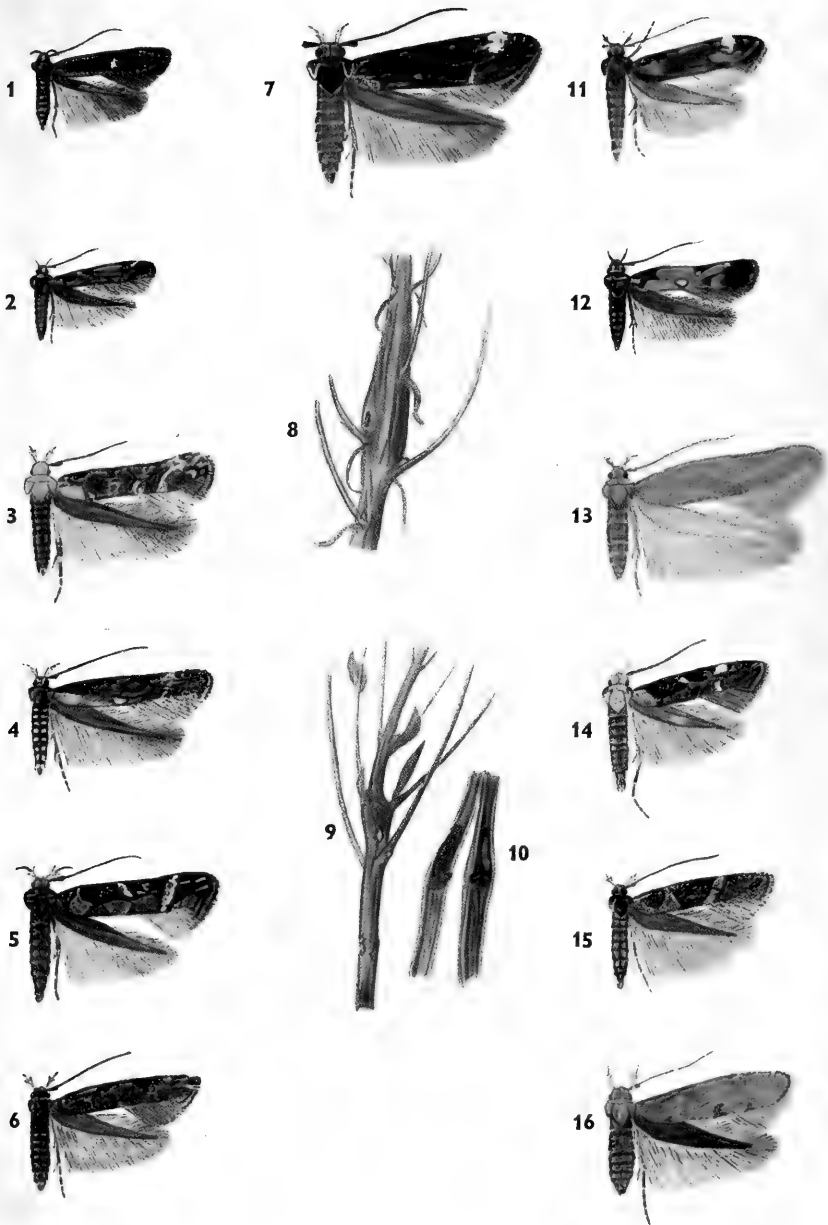
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5 nodicolella.

15 subbistrigella.

6 miscella.

16 fulvescens.



Imagines X3. Galls natural size.

S.N.A. Jacobs del.

BRITISH SPECIES of the GENUS MOMPHA Hb.

NOTES ON THE GENUS MOMPHA.

By S. WAKELY.

Read 11th November 1944.

Illustrated by a Coloured Plate.

There have been many alterations in the constitution of this genus in the past. In Stainton's day the majority of the species were placed in a genus termed *Laverna*. Individuals were dotted about in other genera. *Schrankella*, for instance, was placed with *Chrysoclista*; *langiella*, Hübn., now known as *epilobiella*, Roem., in a genus by itself—*Anybia*; while *terminella* came under *Asychna*. In Meyrick's *Revised Handbook* we find thirteen species listed under the genus *Mompha*. Consulting Pierce and Metcalfe's *Genitalia of the Tineina* one finds twelve species given, *nodicolella* not being included. In fact, the genitalia of that species does not appear to have been described or figured in this country till now, no doubt owing to its great rarity. With this addition, then, we can consider there are thirteen species in the genus known to occur in this country.

With the exception of *miscella*, which is attached to *Helianthemum* (Rock-rose), the larvae of all species feed on *Epilobium* (Willowherb) or its near ally, *Circaea lutetiana* (Enchanter's Nightshade). Seven species have leaf-mining larvae, namely: *epilobiella*, *terminella*, *schrankella*, *raschkiella*, *propinquella*, *lacteella*, and *miscella*; two feed in spun shoots—*conturbatella* and *fulvescens*; one feeds in rootstocks—*ochraceella*; another in seedpods—*subbistrigella*. The remaining two—*decorella* and *nodicolella*—are true gall-makers.

I might mention here that *stephensi* is placed in the genus *Blastodacna* by Pierce and Metcalfe. The foodplant of this species is actually unknown, but the moth can still be taken in numbers during the last fortnight in July at rest on the bark of old oak trees in several of our London parks. There is little doubt but that the larvae feed in the bark (or shoots) of oak. This is the known habit of most of the others in that genus—*aurifrontella*, Hübn., in hawthorn shoots, for instance, and *atra*, Haw., in apple shoots.

Epilobiella, Roem., is included in the genus *Mompha* by Pierce and Metcalfe. Not only does the structure of the genitalia warrant this, but the larvae feed on *Epilobium* (and *Circaea*). Meyrick placed this with *phragmitella*, Staint., in the genus *Limnoecia*.

I will now run through each species in turn.

Mompha epilobiella, Roem.—This was known as *Asychna langiella*, Hübn., by Stainton, and must not be confused with his *Laverna epilobiella*, Schrank, a very different species. *Epilobiella*, Roem., seems to be very local. Known foodplants are *Epilobium hirsutum*, *E. montanum* and *Circaea lutetiana*. I have only found signs of the larvae once, and that was near Effingham, mined leaves of *Circaea* showing broad

whitish blotches. The specimen shown was bred from a pupa found on that occasion spun up in a leaf corner. I also know of its having been found in the New Forest. Larvae should be looked for during the last fortnight in June.

M. raschkiella, Zell.—This is attached to *Epilobium angustifolium* (Rosebay). It is reputed to be local, but I find it wherever the foodplant occurs in quantity. No doubt it is spreading almost as rapidly as the Rosebay. Apparently it was unknown to Stainton. The larvae may be found in whitish mines in leaves of its foodplant in May and June and again in August and September.

M. terminella, Westw.—Considered a great rarity by Stainton, when it was known as *Asychna terminella*. The larvae feed during August and September in leaves of *Circaea lutetiana*. The mines are greenish in colour, the larvae being difficult to detect when the leaf is held up to the light. Several are often found in one leaf, in some years the larvae being very common in restricted spots. Ashted is a good locality for it, and I have also seen it at Boxhill. West Wickham is given by Stainton.

M. conturbatella, Hübn.—The larvae of this species feed in spun shoots of *E. angustifolium* early in the spring. The last half of May is the best time to take them, but not all the spun shoots contain larvae of this species. *Argyroploce lacunana* and other common species often emerge from the spun shoots and are apt to cause disappointment when one has counted on getting a nice series of *conturbatella*. This species is not mentioned in Stainton's "Tineina," and apparently the Rosebay was not so common in those days as it is now. Boxhill and Mickleham have furnished all my specimens, and it appears to be very local.

M. schrankella, Hübn.—This species is one of the most beautiful of the genus. It is local but widely distributed. The larvae mine the leaves of its foodplant during the latter half of July—also in May apparently. I have taken it in numbers feeding on a species of *Epilobium*, most likely *E. roseum*, growing by marshy ditches in the Wilderness, near Rookley, in the Isle of Wight. This year I found several larvae feeding in leaves of *E. lanceolatum* at Warnham, Sussex.

M. propinquella, Staint.—Imagines of this species may occasionally be seen in July resting on fences or foliage near patches of Willowherb. Meyrick gives *E. hirsutum* as foodplant, but in my experience *E. montanum* is more often chosen. The larvae feed in very early spring, mining the lower leaves of *E. montanum*. I have taken full-fed larvae at Norwood at the end of March, when plants are quite small and not easy to find. Mickleham is another locality where it is to be found; also Warnham, Sussex.

M. lacteella, Steph.—Both Stainton and Meyrick speak of this as being not uncommon. Repeated search for larvae during August in leaves of *E. hirsutum* by myself and friends have failed to find any sign of the larvae. I am indebted to Mr H. Stringer, of the British Museum, for the loan of the examples shown.

M. ochraceella, Curt.—This species frequents the large beds of *E. hirsutum* so often seen in damp places. Imagines are seldom seen, but larvae may be found in rootstocks. It is a very muddy job locating the larvae in April, and a better way to procure a series is to examine the lower leaves of the plants at end of May or early June, when a slight pucker on upper side of leaf betrays the whereabouts of a cocoon on underside. The larvae are whitish in colour, and often mine out of the stem into the mid-rib of the leaf as they become full grown.

M. decorella, Steph.—This interesting species makes a gall-like swelling in stems of *Epilobium* during June and July. The best time to collect these galls is the end of July and first week in August. The larva spins a cocoon within the swelling, and a small piece of white showing on side of gall denotes end of cocoon and informs one that stem is all right to take and that larva has pupated. *E. montanum* is the usual foodplant, but *E. palustre* is also recorded by Meyrick, and I have found it on *E. lanceolatum* at Mickleham. Warnham, Sussex, is another locality for this species. A number of galls made by this species are on exhibit.

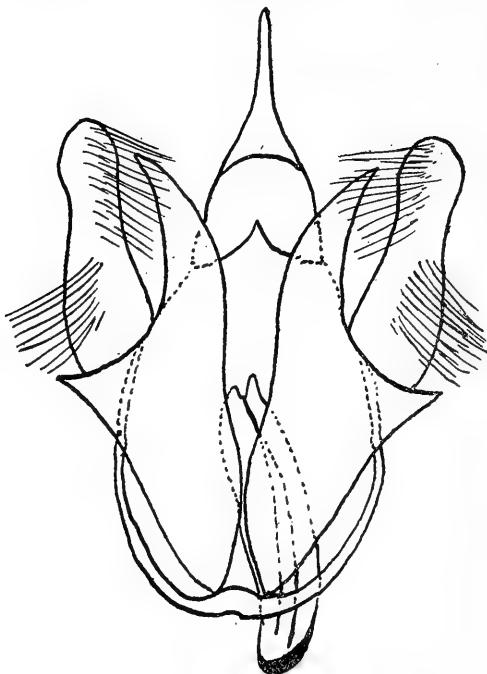
M. subbistrigella, Haw.—This is one of the more common species and is frequently met with indoors during the autumn, winter, and again in the spring. Its hibernating habit is no doubt the reason for its seeking shelter indoors. The larvae may be found during July in the seedpods of *E. montanum*, particularly in gardens where this weed is allowed to flourish. I have been unable to find any external evidence on seedpods of the presence of a larva within, but by twisting the end of the pod it splits lengthwise and discloses a fat reddish larva if that particular pod has been attacked. Imagines emerge during August.

M. fulvescens, Haw.—This is the *epilobiella*, Schrank, of Stainton's day. It is the commonest species of the genus under review, and occurs among *E. hirsutum* wherever it grows—in its marshy haunts or in our gardens and by roadside ditches. The larvae feed in spun shoots, and at times almost every shoot is attacked. Parasites attack these larvae in great numbers, but in spite of this, the species seems to be always abundant. Hibernating specimens are frequently seen during the winter, often very faded and almost unrecognisable.

M. miscella, Schiff.—This was known as *Laverna staintoni*, Sirc., in old lists. It is the only species not attached to *Epilobium* or *Circaea*. The larvae are quite common, feeding in blotches in leaves of *Helianthemum* (Rock-rose), and may be found in early spring and again in July. It is widely distributed wherever its foodplant grows.

M. nodicolella, Fuchs.—So far this species has only been recorded from Westerham, Kent, where Mr Buxton took three specimens on 24th June 1915. Meyrick says: "Larva in swellings in stems and roots of *Epilobium angustifolium*; 6, 7." A galled stem of Rosebay taken in France some years ago by Mr Fassnidge and given by him to Mr L. T. Ford is depicted in the plate. I am grateful to both for being able to provide this illustration. This gall is considered by Mr Fassnidge to be caused by a larva of *nodicolella*. It is interesting to note that it was

made on the flowering portion of stem. I am also indebted to Mr Stringer for the loan of two Continental specimens. It will be noticed that they bear a superficial resemblance to *subbistrigella*, but the ground colour is darker and the markings more distinct. It is possible that *nodicolella* will become more plentiful in a similar way to that in which the other two Rosebay species (*raschkiella* and *conturbatella*) are gradually increasing their range. For the drawing and description of the genitalia that follows, I am indebted to the Rev. Desmond P. Murray:



11/44.

Del. D. P. Murray.

Genitalia of Male *Mompha nodicolella*, Fuchs. $\times 60$.

Uncus straight, slightly widened about middle. *Sacculus* strong, pointed, with curved point about middle. *Valvula* rounded, thickened at costa. *Aedoeagus* short, stout, divided at orifice, holding long cornuti.

In conclusion I would like to emphasize that the best and easiest way to get series of this genus is to collect the larvae. Caught imagines are seldom fit for the cabinet, and imagines of several of the species are seldom seen even where the insect is known to be common.

It is hoped that the species will be recognisable and distinguishable one from the other by the colour plate facing page 81, which also depicts the larval galls described of *decorella* and *nodicolella*. For the excellent coloured drawings from which the plate was prepared I must express my thanks to Mr Stanley N. A. Jacobs.

NOTES ON BRITISH PLECOPTERA.

By E. E. SYMS.

Read 9th December 1944.

The Plecoptera included by Linnaeus in the Order Neuroptera, in which they later formed the family Perlidae, like most of the families in that Order have been separated to form a distinct Order. Latreille in 1802 was the first to separate them, calling them Perlariae, but Burmeister in 1839 changed this to Plecoptera, and it is by this name that they are now known. In Britain they are popularly called Stoneflies, and in America they are sometimes referred to as Water-crickets. They form quite a small Order, and have many characters similar to those of the Orthoptera. In this country only 34 species are known to occur and these are divided into 16 genera, 6 families, and 2 sub-orders, but there are so few workers at this Order that it is more than probable others are awaiting discovery. The last addition to our list was as recent as 1943 (D. E. Kimmins).

In Britain the Order has not received the attention it deserves; this is probably due, among other things, to there being no standard work on the Order, to the adults being dull coloured, and to the shrivelling of the specimens when drying, making it very difficult to identify them. J. Curtis in 1827, E. Newman in 1833, and J. F. Stephens in 1835, all published descriptions of our species, and R. McLachlan in 1870, C. W. Dale in 1907, and W. J. Lucas in 1932 each published a list of our species, but all are now out of date and require revising. Since these lists there have been published two important papers by H. B. N. Hynes in 1940 and 1941, and these two enable us to name most of the nymphs and all the adults then known, but much remains to be done before our knowledge of the Order is as good as that of the Lepidoptera.

I have compiled the list of the known British species appearing at the end of this paper with the assistance of Claassen's 1940 Catalogue. Two names only differ from Hynes: *Rhabdiopteryx neglecta* and *Brachyptera putata*, Newman, are dropped as synonyms with *R. anglica*, Kim. and *B. trifasciata*, Pict., respectively. As regards the sub-orders, Filipalpia Klap. 1905 is synonymous with Holognatha Endl. 1909, while Subulipalpia Klap. 1905 is synonymous with Systellognatha Endl. 1909 or Setipalpia Klap. 1909.

These insects have an incomplete metamorphosis, there being no pupal stage. The eggs are dropped by the female into the water, where, sinking to the bottom, they remain until hatching takes place. This interval varies with the species, some hatching at the end of 14 days, others taking as long as 110 days. The nymphs generally get under cover of stones or decaying leaves, and in most cases arrive at maturity in one year, passing through some 22 instars; some, however, take three years to complete their metamorphoses. Most nymphs breath by means

of bunches of finger-like gills which vary in position and number with the family, a few like *Nemoura* breathe by rectal gills. When about to emerge the nymph crawls out of the water, up stones, trees or other objects near the water, then the skin dries and splits on the dorsal surface of the thorax, and the adult insect crawls out. At first its wings are white and carried over the back like a butterfly, but they soon take up the final position of rest, folded flat upon the back. The adult insect carries its head in a similar way to that of a grasshopper. It has long antennae which are simple in structure. Of the four membranous wings, the hind pair are generally large and shaped like those of the Orthoptera. In some families the cerci are long, often longer than the body, but in the Nemouridae they are short and apparently of one segment only. In many species there are two forms of the male, a short and a long-winged form, and in some species both male and female have long and short-winged forms. These generally occur at high altitudes.

In most insects in which short-winged forms occur in one sex only it is the female that has the short wings, but in this Order it is the males that have the short wings. C. A. Briggs in 1897, records the males of certain Plecoptera as stridulating; perhaps calling the female may be an explanation of this character.

Early writers on these insects regarded the nymphs as carnivorous, but recent studies have shown that only the Perlidae are carnivorous, and even they feed partly upon vegetable substances, the other members of the Order being herbivorous. It was also thought that the adults did not feed but this has been proved to be false, as many are known to feed on green algae growing upon trees and rocks, and in America E. J. Newcome, in 1918, reported them as doing damage to the buds of fruit trees.

I have collected nymphs of several species and found them very difficult to rear in captivity. I only succeeded when the nymphs were collected fully grown and then by keeping them on water weeds kept moist with rain water. London tap water is fatal. Most of the authors who have studied the life history of these insects have kept their nymphs alive by placing them in perforated cages sunk in the bed of the stream, and when the nymphs were about to emerge lifting the cages, so that the nymphs could crawl up the sides out of the water. All the nymphs seem to require pure, well aerated water. Their natural home is in streams, large lakes, and ponds that have an overflow. They live under stones, on the sheltered side of stones in fast flowing streams, under pieces of timber resting upon the bed, or among collections of decaying leaves. They are gregarious and often occur in large numbers.

The commonest Plecopteron in the South-East of England is *Nemoura variegata*, Oliv., and this is to be found everywhere. It breeds in small streams, field ditches and ponds. I have found it quite commonly in all the districts that I have worked. In the genus *Nemoura* all the members have the wing nervures of the pterostigma forming an X. The nymphs are generally covered with mud and feed upon leaves decaying in the water, of which they eat the soft part only leaving the skeleton.

Adults seem to live for a short time only, but there is a long period of emergence, from early April to the end of June. They can be found during the day time resting on the foliage of trees or sometimes upon stones or posts near the place where they lived as nymphs. Occasionally they may be seen to fly but their flight is slow and somewhat like that of the smaller Trichoptera. Mating often takes place in the day time and paired insects can be seen resting upon leaves, trees, and posts. The male approaches the female with its head and thorax raised; these pass over those of the female and then he grasps her thorax with his front and second pair of legs; next the abdomen is bent so that its end is under that of the female, and mating takes place.

The eggs of the Plecoptera are very interesting. They are carried by the female at the end of the body between the sub-genital plate and the ventral surface of the abdomen for some days before being deposited. E. Percival and H. Whitehead in 1928, and H. B. N. Hynes in 1941, have studied the structure of some and described a few of the eggs. Those of *Dinocras cephalotes*, Curt., and *Perla carlukiana*, Klap., are described as being dark coloured, ovoid in shape, with a short collar-like ring round the base of the egg. In the centre of this ring is a stalk carrying at its end a basal plate. This stalk is elastic, capable of being stretched to three or four times its length and then returning to its normal length. The basal plate has the surface outwardly convex and is covered with a number of mushroom-shaped bodies. The entire egg is covered with a gelatinous substance. When the egg touches the water this coating quickly swells and the egg sinks slowly down to the bottom of the stream, where the mushroom bodies hold it in position until hatching takes place. The gelatinous covering slowly dissolves. The eggs hatch between the 95th and 110th day. The eggs of *Leuctra hippopus*, Kemp., are yellow in colour, spherical in shape, surrounded with a jelly-like substance but without the collar-like ring. These eggs adhere to any surface they touch, and are held until they hatch, this taking place between the 28th and 40th day. The eggs of the Plecoptera with their dark centre and outer coating of jelly remind one of microscopic frogs-spawn.

In the New Forest near Brockenhurst, in April 1939, I watched *Leuctra hippopus* ovipositing. The insects were flying up the stream about one foot above the water, at short intervals coming down and touching the surface of the stream. I caught several and found them to be females with a large mass of eggs at the tail. Thinking that this was the method of ovipositing, I held one of the insects by its wings and allowed the tail to touch the water in a glass tube, whereupon, immediately the egg mass touched the water one or two eggs swelled up, and did it so rapidly that they were forced off the mass and slowly sank down to the bottom of the tube. There the jelly that surrounded the eggs was slowly dissolved, but the egg remained fixed in position. The family Leuctridae is very similar in general appearance to Nemouridae differing, however, in the absence of the X in the wing and in the insect resting with its wings curved in a half cylinder round its body. Another family, Taeniopterygidae, has its wings in similar position but the tar-

sal joints are nearly equal, those of Leuctridae having second joint short.

In May 1937, I was paying a short visit to the Lake District, and on one of my rambles came to a stream running down from the mountain and flowing into Coniston Lake. Passing a stone bridge that crossed this stream I noticed a large insect at rest on the stonework and on examining it I recognised it as *Perla carlukiana*, Klap. Wishing to learn something of the earlier stages of this insect, I spent the day in the neighbourhood searching for any scraps of information that were to be had. I knew that the nymphs were to be found under stones, so began turning over stones that were bedded in the stream. I soon found many nymphs, but there were two kinds and two sizes. At the time I wondered if the two sizes represented the two sexes, but later found out that these nymphs take three years to complete their growth. I collected a number and brought them back to London; all the small ones died but several of the larger nymphs, kept on water weed, emerged during the next two weeks. Whilst in the stream turning stones, I saw several adults run on the surface of the water. This surprised me and I thought it was an accident, but later I saw one deliberately leave a stone and run on the water. All those seen on the water were fully winged insects; I caught some and found that they were females carrying a cluster of eggs at the tail, so evidently this is the normal method of ovipositing, the eggs being washed off the tail as the insect travels over the water. At that time I did not know of the interesting egg structures, so failed to examine them microscopically.

For the identification of the adults several characters have to be examined, the length of the cerci, the neurulation, and the genital structures, but fortunately this can be done with a pocket lens. As the abdomen shrinks considerably when drying it is best to keep some specimens in 2% Formalin.

PLECOPTERA, Burmeister.

Sub-order SUBULIPALPIA, Klapálek.

Perlodidae, Klapálek.

Perlodes mortoni, Klapálek.

Dictyoperygella bicaudata, Zetterstedt.

Isogenus nubecula, Newman.

Perlidae, McLachlan.

Dinocras cephalotes, Curtis.

Perla carlukiana, Klapálek.

Isoperla grammatica, Poda.

I. grisetipennis, Pictet.

Chloroperla apicalis, Newman.

C. torrentium, Pictet.

C. tripunctata, Scopoli.

Sub-order FILIPALPIA, Klapálek.

Capniidae, Klapálek.

Capnia nigra, Pictet.

C. atra, Morton.

C. vidua, Klapálek.

Taeniopterygidae, Klapálek.

- Taeniopteryx nebulosa*, Newport.
Brachyptera trifasciata, Pictet.
B. risi, Morton.
Rhabdiopteryx anglica, Kimmins.

Leuctridae, Klapálek.

- Leuctra geniculata*, Stephens.
L. moselyi, Morton.
L. hippopus, Kempny.
L. inermis, Kempny.
L. nigra, Olivier.
L. fusciventris, Stephens.
Protonemura montana, Kimmins.
P. meyeri, Pictet.
P. praecox Morton.

Nemouridae, Klapálek.

- Amphinemura cinerea*, Olivier.
A. standfussi, Ris.
Nemoura variegata, Olivier.
N. dubitans, Morton.
N. cambrica, Stephens.
N. avicularis, Morton.
N. erratica, Claassen.
Nemurella inconspicua, Pictet.

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1905-6	2 6	1933-34	12 6+
1906-7	2 6	1934-35	10 6+
1907-8	2 6	1935-36	12 6+
1908-9	2 6	1936-37	10 6
1909-10	5 0*	1937-38	10 6+
1910-11	4 6	1939-40	10 0+
1911-12	4 6+	1940-41	5 0+
1912-13	4 0*	1941-42 Pt. I	2 0
1913-14	4 0*	1941-42 Pt. II	6 0+
1914-15	4 0	1942-43 Pt. II	5 0+
1915-16	5 0+	1943-44	6 0*
1916-17	3 6+				

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OF
THE SOUTH LONDON
Entomological and Natural History
Society.

1945-46.

WITH ELEVEN PLATES.

**PUBLISHED AT THE SOCIETY'S ROOMS,
BURLINGTON HOUSE, PICCADILLY, - LONDON, W.1.**

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PRICE FIFTEEN SHILLINGS.

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PUBLISHED AT THE SOCIETY'S ROOMS:
BURLINGTON HOUSE, PICCADILLY, LONDON, W.1.

Printed by T. Buncle & Co. Ltd., Market Place, Arbroath.

1946.

The Council gratefully acknowledges
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1907	ANDREWS, H. W., F.R.E.S., 6, Footscray Road, Eltham, London, S.E.9.	<i>d</i> .
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- 1945 BALTER, R. S., F.R.E.S., 18, Ferncroft Avenue, London. N.W.3.
ent, mi, bi.
- 1942 BANNER, JOHN V., M.R.C.S., L.R.C.P., R.A.M.C., "Wykehurst," 41,
Varndean Gardens, Brighton, 6. *l.*
- 1896 BARNETT, T. L., 31, Littleheath Road, Selsdon, Surrey. *l*
- 1933 BAYNES, E. S. A., F.R.E.S., c/o Glyn Mills & Co., Childs Branch,
1, Fleet Street, London, E.C.4. *l.*
- 1943 BECHER, Lt.-Col. L. E., "Newstead," Charterhouse Road, Godal-
ming, Surrey. *l.*
- 1944 BEDFORD, E. J., F.R.P.S., 11, St John's Terrace, Lewes, Sussex.
nat. hist.
- 1938 BEIRNE, B. P., PH.D., F.R.E.S., F.L.S., 4, Tobernea Terrace, Monks-
town, Co. Dublin, Eire. *micro-l.*
- 1929 BELL, J. H., Dudswell Rise, Northchurch, Berkhamsted, Herts.
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ent.
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Wood, Esher, Surrey. *bi*
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Lane, Old Coulsdon, Surrey. *ent (Chalcididae).*
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ec. ent, b, marine life.
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- 1922 BUSHBY, L. C., F.R.E.S., c/o Zoological Society of London, Regent's Park, London, N.W.8. *c, hem.*
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- 1934 COLE, G. A., M.A., F.C.A., Ronkswood Hospital, Newtown Road, Worcester. *l.*
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- 1918 COURT, T. H., F.R.E.S., "Oakleigh," Market Rasen, Lincoln.
- 1943 COUSINS, ROBERT J., A.C.P., M.R.S.T., F.R.E.S., F.R.S.A., F.Z.S., High Street, Ashcott, near Bridgwater, Somerset. *mo*, *c*.
- 1937 CRABTREE, B. H., F.R.E.S., "Highfield," Alderley Edge, Cheshire. *l*.
- 1934 CRASKE, J. C. B., F.R.E.S., 33, Hinchley Drive, Hinchley Wood, Esher, Surrey. *l*.
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- 1920 CROCKER, Capt. W., 55, Townley Road, Bexleyheath, Kent. *l*.
- 1932 CROW, P. N., "Heathcote," Bigfrith, Cookham Dean, Berkshire. *l*.
- 1937 CURTIS, A. E., "The Cottage," Ifold Estate, Loxwood, Billingshurst, Sussex. *l*.
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- 1927 DANBY, G. C., "Sheringham," 31, Albion Road, Sutton, Surrey. *l*.
- 1946 DARBY, Miss DAPHNE A., B.SC., 139, Huntingdon Road, Cambridge. *ec*, *ent*.
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- 1940 DAVIS, G. A., 76, Station Road, Chingford, London, E.4. *c*.
- 1900 DAY, F. H., F.R.E.S., 26, Currock Road, Carlisle. *l*, *c*.
- 1938 DEAL, JAMES, 18, Manor Road, West Wickham, Kent. *l*.
- 1933 DEMUTH, Lieut. R. P., R.N.V.R., c/o Lloyds Bank, West Southbourne, Bournemouth. *l*.
- 1930 DENVIL, H. G., *Council*, 4, Warwick Road, Coulsdon, Surrey. *l*, *c*.
- 1945 DIXON, C. H., Northbrook Farm, Micheldever, Hants. *ent*.
- 1901 DODS, A. W., 35, The Mall, Southgate, London, N.14. *l*.

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Chalcidoidea.
- 1936 DOUDNEY, S. P., "Thurne," 110, Foxley Lane, Purley, Surrey. *l*.
- 1946 DOWNES, W. E., 29, Aragon Road, Kingston, Surrey. *l*.
- 1930 DUDBRIDGE, B. J., B.A., c/o The Secretariat, Dar-es-Salaam,
Tanganyika. *ent*.
- 1946 DUFFY, E. A. J., 28, Lansdowne Road, Croydon, Surrey. *c*.
- 1927 EAGLES, T. R., *Hon. Editor of Proceedings*, 32, Abbey Road, En-
field, Middlesex. *l, c*.
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London, N.10. *l*.
- 1937 EASTON, N. T., D.F.H., F.R.E.S., Sulby Hall, Welford, near Rugby,
Staffs. *l, g, nat. phot*.
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- 1945 EDWARDS, R. C., Arlesley, Pilgrims' Way, Westerham, Kent. *ent*.
- 1941 EDWARDS, Rev. Canon T. G., M.A., F.Z.S., Holy Trinity Vicar-
age, Tulse Hill, London, S.W.2. *l*.
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- 1945 ELLISON, R. ELDON, 1, Redland Green Road, Bristol. *l*.
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- 1932 ENNIS, L. H., 14, Ernie Road, Wimbledon, London, S.W.20. *l*.
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ampton. *l, n, hem*.
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ent, nat. phot.
- 1943 FORD, E. B., M.A., D.SC., F.R.S., The University Museum, Oxford.
ent, g.
- 1920 FORD, L. T., B.A., *Vice-President*, "St Michaels," 70, Park Hill
Road, Bexley, Kent. *l*.
- 1941 FORD, R. L. E., F.R.E.S., F.Z.S., "Durfold," 34, Park Hill Road,
Bexley, Kent. *ent*.
- 1939 FORSTER, H. W., 76, Station Road, Chingford, London, E.4. *c*.
- 1915 FOSTER, T. B., "Downlands," 24, York Road, Selsdon, Surrey. *l*.
- 1933 FRASER, ANGUS, 28, Gloucester Road, Tankerton, Kent. *c*.
- 1945 FRASER, Miss CAROL DE C., Warren Mount, Freshfield, near Liver-
pool. *l*.
- 1943 FRASER, G. de C., Warren Mount, Freshfield, near Liverpool. *ent*.
- 1943 FRASER, Mrs G. de C., Warren Mount, Freshfield, near Liverpool.
ent.

YEAR OF
ELECTION.

- 1945 FRASER, Capt. M. G., 111, Broadhurst Gardens, London, N.W.6. *c.*
- 1945 FREEMAN, JOHN A., B.Sc., PH.D., A.R.C.S., F.R.E.S., 9, Wendover Road, Bromley, Kent. *ent, ecology.*
- 1946 FRIEDLEIN, A. F. E., F.R.E.S., Newstead, Rayleigh Road, Hutton, Essex. *l.*
- 1946 GARDINER, B. O. C., The Red House, River-in-Dover, Kent. *ent.*
- 1930 GILLIAT, F. T., B.A., F.R.E.S., 25, Manor Rd., Folkestone, Kent. *l.*
- 1929 GLEGG, D. L., F.R.E.S., "Birchstone," Coombe Park, Kingston, Surrey. *l.*
- 1946 GODDARD, T. D., F.R.E.S., Long Hoyle Farm, Heyshott, Midhurst, Sussex. *l.*
- 1936 GOODBAN, B. S., 81, West Street, Ewell (Epsom), Surrey. *l.*
- 1935 GOODLIFFE, F. D., M.A., F.R.E.S., Lord Wandsworth Agricultural College, Long Sutton, Basingstoke. *ec. ent.*
- 1946 GOODMAN, A. T., B.Sc., 10, Central Mansions, Hendon, London, N.W.4. *z.*
- 1942 GOODSON, A. L., 26, Park Road, Tring, Herts. *l.*
- 1926 GORDON, D. J., B.A., F.R.E.S., Table Office, House of Commons, London, S.W.1. *c, l.*
- 1936 GOWING-SCOPES, E., "Oakhurst," Oakwood Road, Crofton, Orpington, Kent. *l.*
- 1924 GRANT, F. T., 37, Old Road West, Gravesend, Kent. *l, c.*
- 1945 GRANT, JOSEPH HENRY, F.R.E.S., 74, Coleshill Road, Birmingham, 8. *l, ent.*
- 1926 GREY, Mrs OLIVE, F.Z.S., 66, Barrington Court, Pages' Hill, London, N.10. *ent.*
- 1945 HAMERTON, J. L., 35, Bodley Road, New Malden, Surrey. *l, od.*
- 1891 HAMM, A. H., M.A., A.L.S., F.R.E.S., 22, Southfield Road, Oxford. *l.*
- 1944 HAMMOND, H. E., F.R.E.S., 16, Elton Grove, Birmingham, 27. *l, ent.*
- 1943 HARDS, C. H., F.R.E.S., 40, Riverdale Road, Plumstead, London, S.E.18. *l.*
- 1902 HARE, E. J., F.R.E.S., Harrow Place, Pinden, Dartford, Kent. *l.*
- 1943 HARPER, Comdr. G. W., R.N., F.R.E.S., Bramblewood, Bushby Avenue, Rustington, Sussex. *l.*
- 1936 HARRIS, W. H. A., 48, Corringway, London, W.5. *l.*
- 1924 HARWOOD, P., F.R.E.S., Laurel Bank, Aviemore, Inverness-shire, N.B. *l, c.*
- 1927 HAWGOOD, D. A., 2, Kingsmead Road, Tulse Hill, London, S.W.2. *l.*
- 1924 HAWKINS, Capt. C. N., F.R.E.S., *Council*, 23, Wilton Crescent, Wimbledon, London, S.W.19. *l, c, g.*
- 1929 HAWLEY, Lt.-Col. W. G. B., D.S.O., "Amber Cottage," Bodenham, near Salisbury, Wilts. *l.*
- 1943 HAYNES, H., 6, Nelson Road, Salisbury, Wilts. *l.*

YEAR OF
ELECTION.

- 1938 HAYNES, R. F., "The Sanctuary," Burney Road, West Humble, Dorking, Surrey. *l.*
- 1923 HAYWARD, Capt. K. J., F.R.E.S., F.Z.S., F.R.G.S., Instituto Miguel Lillo, Calle Miguel Lillo, 205, Tucuman, Republica Argentina. *l, orn, c.*
- 1945 HEATH J., F.R.E.S., "Heathcot," Hedge End, Southampton. *l.*
- 1935 HEDGES, A. V., F.R.E.S., "Ballovale," Santon, Isle of Man. *l.*
- 1920 HEMMING, Capt. A. F., C.M.G., C.B.E., F.Z.S., F.R.E.S., c/o Ministry of Fuel and Power, Dean Stanley Street, London, S.W.1. *l.*
- 1924 HENDERSON, J. L., *Hon. Treasurer*, 6, Haydn Avenue, Purley, Surrey. *c.*
- 1945 HESLOP, Mrs E. A., 12, Inglis Road, Southsea, Hants. *l.*
- 1931 HESLOP, I. R. P., M.A., F.R.E.S., c/o Messrs Griffiths and McAlister, 10, Warwick Street, Regent Street, London, W.1. *l.*
- 1937 HICK, E. PENTLAND, F.R.E.S., F.Z.S., "Athol House," Fulford Road, Scarborough, Yorks. *l.*
- 1945 HINTON, H. E., B.SC., PH.D., F.R.E.S., British Museum (Natural History), South Kensington, London, S.W.7.
- 1944 HITCHINS, Capt. P. E. N., B.SC., Sicklebanc, Horem, Sussex. *ent.*
- 1944 HODGSON, S. B., 5, Charles Street, Berkhamstead, Herts. *l.*
- 1943 HOLLEBONE, Comr. L. H. T., O.B.E., R.N., 74, Kensington Court, Kensington, London, W.8.
- 1946 HOLROYD, GEORGE C., The Matchbox, 8, Elmside, Onslow Village, Guildford, Surrey. *l.*
- 1945 HOWARD, A. P., 19, Limes Avenue, Mill Hill, London, N.W.7. *ent.*
- 1927 HOWARD, J. O. T., M.A., *Council*, 1, Wedderburn House, Hampstead, London, N.W.3. *l.*
- 1931 HOWARTH, T. G., B.E.M., F.R.E.S., Shanklin, 1, Gloucester Road, Redhill, Surrey. *l.*
- 1934 HUGGINS, H. C., F.R.E.S., 875, London Road, Westcliff-on-Sea, Essex. *l, ent.*
- 1929 HUGHES, ARNOLD W., 16, Buckingham Way, Wallington, Surrey. *l.*
- 1939 HULLS, L. G., F.C.S., F.R.M.S., F.R.E.S., "Rax," Chidham, near Chichester, Sussex. *ent.*
- 1938 HUMPHREYS, J. A., White Cross Service Station, 155, Reigate Avenue, Sutton, Surrey. *l.*
- 1946 HURTER, D. G., 41, Garston Old Road, Liverpool, 19. *l.*
- 1933 HUTCHINGS, H. R., 127, Chadacre Road, Stoneleigh, Surrey. *l.*
- 1928 JACKSON, F. W. J., "The Pines," Ashted, Surrey.
- 1940 JACKSON, Capt. REGINALD A., R.N., F.R.E.S., *President*, "The Hermitage," Bishops Waltham, Hants, and the Junior United Services Club, London, S.W.1. *ent, l.*
- 1945 JACKSON, W. H., Northeroak Cottage, Lyndhurst, Hants. *l.*

YEAR OF
ELECTION.

- 1923 JACOBS, S. N. A., *Council*, "Ditchling," 54, Hayes Lane, Bromley, Kent. *l, e l*.
- 1924 JAMES, A. RUSSELL, "Braemar," Morgan Crescent, Theydon Bois, Essex. *l*.
- 1936 JAMES, W. H., 41, Carson Road, Dulwich, London, S.E.21. *l*.
- 1928 JANSON, O. J., F.R.E.S., *Recorder*, 15, Kingshill Crescent, St Albans, Herts, or 46, Beresford Road, Hornsey, London, N.8. *ent*.
- 1942 JAQUES, J. M., 12, Coulsdon Road, Coulsdon, Surrey. *l*.
- 1925 JARVIS, C. MACKECHNIE, F.L.S., 68, Clyfford Road, West End Road, Ruislip, Middlesex. *c*.
- 1938 JARVIS, F. V. L., B.SC., 21, Shirley Avenue, Sutton, Surrey. *l, g*.
- 1945 JOHNSON, Col. G. F., D.S.O., Castlesteads, Brampton, Cumberland. *l*.
- 1946 KAUFMANN, R. R. U., Sunnyside, Northwich Road, Cranage, Knutsford, Cheshire. *c*.
- 1946 KEMP, J. K. C., Perrymead House, Bath, Somerset. *l*.
- 1943 KERSHAW, Col. S. H., D.S.O., Alderman's Place, Aspley Heath, Bletchley, Bucks. *l*.
- 1928 KETTLEWELL, H. B. D., M.A., M.B., B.CHIR., M.R.C.S., L.R.C.P., F.R.E.S., *Council*, "Homefield," The Common, Cranleigh, Surrey. *g, l*.
- 1910 KIDNER, A. R., "Whitelèa," Fitzgerald Avenue, Seaford, Sussex. *l*.
- 1925 KIMMINS, D. E., R.A.F., 6, St John's Road, Penge, London, S.E.20. *l, n*.
- 1933 KING, H., D.SC., F.R.S., "Gavarnie," Wise Lane, Mill Hill, London, N.W.7. *l, orn*.
- 1944 KLOET, G. S., F.Z.S., F.R.E.S., 8, Knutsford Road, Wilmslow, Cheshire. *ent*.
- 1925 LABOUCHERE, Lt.-Col. F. A., F.R.E.S., 15, Draycott Avenue, Sloane Square, London, S.W.3.
- 1945 LANG, R. M., A.C.A., 9, Tabor Gardens, Cheam, Surrey. *l*.
- 1941 LAST, H. R., *Council*, 12, Winkworth Road, Banstead, Surrey. *c, l*.
- 1927 LAWSON, H. B., F.R.E.S., "Churchmead," Pirbright, Surrey. *l*.
- 1914 LEEDS, H. A., Wood Walton, Huntingdon. *l*.
- 1934 LINE, H. V., 11, Priory Avenue, Petts Wood, Orpington, Kent. *l*.
- 1933 LIPSCOMB, Lt.-Col. C. G., Misterton, Somerset. *l*.
- 1937 LISNEY, A. A., M.A., M.B., F.R.E.S., The Red House, Narborough, Leicester. *l*.
- 1942 LLOYD, Major C. T., D.SC., PH.D., F.R.E.S., 25, Belmont Avenue, New Malden, Surrey. *l*.
- 1935 LOWE, Lt.-Col. J. H. B., R.E., c/o Lloyds Bank Ltd., Cox's & King's Branch, 6, Pall Mall, London, S.W.1. *l*.

YEAR OF
ELECTION.

- 1931 MACNULTY, B. J., "Rutland," 67, All Saints Road, Sutton, Surrey. *l*.
- 1892 MAIN, H., B.SC., F.R.E.S., F.Z.S., 9, Woodside Road, Woodford Wells, Essex. *l, nat. phot, c*.
- 1945 MANLEY, Lt.-Col. W. B. L., The Guards Club, London, W.1. *ent*.
- 1945 MANLY, G. B., 72, Tenbury Road, King's Heath, Birmingham, 14. *ent, l*.
- 1889 MANSBRIDGE, W., M.SC., F.R.E.S., "Monreith," Derby Road, Formby, Liverpool, Lancs. *l, c*.
- 1932 MARCON, Rev. J. N., Christ Church Vicarage, Seaside, Eastbourne, Sussex. *l*.
- 1930 MARSH, Capt. DUDLEY G., Gara-Tor, Pigeon Lane, Eddington, Nr. Herne Bay, Kent. *l*.
- 1922 MASSEE, A. M., D.SC., F.R.E.S., East Malling Research Station, Kent. *l*.
- 1943 MATTHEWS, J. K., M.A., Greystoke, Freshfield, near Liverpool. *l, b, orn*.
- 1946 MELLOWS, CHARLES, Alliot House, The College, Bishops Stortford, Herts. *l, hym*.
- 1932 MELLOWS, W. T., M.B.E., LL.B., "The Vineyard," Minster Precincts, Peterborough, Northants. *l*.
- 1946 MERE, R. M., Pembroke Lodge, Steepways, Hindhead, Surrey. *l*.
- 1942 METCALFE, PERCY, C.V.O., R.D.I., A.R.C.A., 70, Madrid Road, Barnes, London, S.W.13. *l*.
- 1945 MICHAUD, J., PH.D., 22, Routh Road, London, S.W.18. *ent*.
- 1945 MILNE-REDHEAD, E., 7, Ashley Gardens, Petersham, Richmond, Surrey. *c*.
- 1943 MILTON, P. W., 23, Woodstock Road, Carshalton, Surrey. *c, ent*.
- 1938 MINNION, W. E., 57, Lloyd Court, Pinner, Middlesex. *l*.
- 1944 MOODY, NORMAN H., 119, Southampton Road, Ringwood, Hants. *ent, orn*.
- 1946 MOORE, B. P., B.SC., The University, Sheffield, 10. *od, l*.
- 1889 MOORE, H., F.R.E.S., 9 Hoopwick Street, Deptford, London, S.E.8. *l, hem, d, e l, e hym, e d, mi*.
- 1945 MOORE, JOHN W., F.R.E.S., Middleton Dene, 151, Middleton Hall Road, King's Norton, Birmingham, 30. *e rhopalocera*.
- 1920 MORISON, G. D., B.SC., PH.D., F.R.E.S., Dept. Advisory Entomology, N. of Scotland Agricultural College, Marischal College, Aberdeen, N.B. *ec. ent*.
- 1930 MORLEY, A. McD., O.B.E., M.A., F.R.E.S., 9, Radnor Park West, Folkestone, Kent.
- 1945 MORRELL, H. A., 63, Salisbury Avenue, Cheam, Surrey. *l*.
- 1937 MORTIMER, D. A., 31, Junction Street, Dudley, Worcs. *hym*.
- 1940 MORTIMER, Mrs D. A., 31, Junction Street, Dudley, Worcs. *ent*.
- 1937 MOWBRAY, M. J., 10, Carisbrooke Road, St Leonards. *ent*.

YEAR OF
ELECTION.

- 1935 MULLER, Miss I. M., "Appledore," Mugswell, Chipstead, Surrey.
ent.
- 1945 MURRAY, Rev. D. P., The Priory, Wellington Street, Leicester. *l.*
- 1934 MUSGRAVE, A. J., B.SC., A.R.C.S., F.R.E.S., 21 Loveday Road, London, W.13. *ent.*
- 1945 NEWMAN, L. HUGH, F.R.E.S., Chestnut House, Cold Blow, Bexley, Kent. *l.*
- 1945 NEWTON, J. L., M.R.C.S., L.R.C.P., Alconbury Hill, Huntingdon.
l, b.
- 1930 NIBLETT, M., 10, Greenway, Wallington, Surrey. *galls.*
- 1938 ODD, D. A., 11, Wickham Avenue, Cheam, Surrey. *l.*
- 1932 O'FARRELL, A. F., B.SC., A.R.C.S., F.R.E.S., 90, Woodwarde Road, Dulwich, London, S.E.22. *od, cr, ent.*
- 1934 OLIVER, G. B., Harefield Road, Luton, Beds. *l.*
- 1943 OLIVER, G. H. B., "Corydon," Amersham Road, Hazlemere, High Wycombe, Bucks. *l.*
- 1945 OWEN, GODFREY V., Orford, 63, Manor Park Road, West Wickham, Kent. *l.*
- 1946 PALMER, D. S., Hillside Lodge, Ridgeway, Horsell, Woking, Surrey. *ent.*
- 1942 PARFITT, R. W., 1, Dunsdon Avenue, Guildford, Surrey. *l.*
- 1946 PARMENTER, Capt. L., F.R.E.S., 94 Fairlands Avenue, Thornton Heath, Surrey. *d.*
- 1945 PARSONS, I. D., The Old School, Broxbourne, Herts. *l.*
- 1940 PAYNE, L. G., 22, Marksbury Avenue, Richmond, Surrey. *c.*
- 1940 PAYNE, R. M., c/o 22, Marksbury Avenue, Richmond, Surrey. *c.*
- 1940 PELHAM-CLINTON, EDWARD C., R.A., Trebles Holford, Bishops Lydeard, near Taunton, Somerset. *l.*
- 1928 PERKINS, J. F., B.SC., F.R.E.S., 95, Hare Lane, Claygate, Surrey. *hym.*
- 1944 PERRY, K. M. P., 21, Cornwall Road, Cheam, Surrey. *c.*
- 1933 PEYTON, A. G., 29, Grove Road, Ramsgate, Kent. *l.*
- 1945 PHILPOTT, V. W., "Saracen's Head," Bath, Somerset.
- 1944 PICKARD, JAMES N., PH.D., M.A., F.R.S.E., Craufurd, Mill Lane, Sawston, Cambs. *l, g.*
- 1933 PINNIGER, E. B., F.R.E.S., Dalegarth, 5, Endlebury Road, Chingford, London, E.4. *od, n. l.*
- 1943 PITMAN, C. M. R., "Malvern," Southampton Road, Clarendon, Salisbury, Wilts. *l, orn. b, etc.*
- 1946 PLAYFORD, F. L., c/o Empire Memorial, 747, Commercial Road, London, E.14. *r.*
- 1945 PRATT, C. BIGNELL, 1, West Ham Lane, Stratford, London, E.15.
ent.
- 1924 PRIEST, C. G., 5, Kensal Road, Paddington, London, W.10. *l.*
- 1945 PUREFOY, J. BAGWELL, Ridge House, Broom Close, Esher, Surrey. *l.*

YEAR OF
ELECTION.

- 1945 QUIBELL, WILLIAM, "Coombs," High Street, Brampton, Huntingdon. *l.*
- 1922 RAIT-SMITH, W., F.Z.S., F.R.E.S., F.R.H.S., "Hurstleigh," Linkfield Lane, Redhill, Surrey. *l.*
- 1945 RICHARDS, O. W., M.A., D.SC., F.R.E.S., Department of Zoology, Imperial College of Science and Technology, South Kensington, London, S.W.7. *ent.*
- 1942 RICHARDSON, AUSTIN, M.A., F.R.E.S., Beaudesert Park, Minchinhampton, Glos. *l.*
- 1920 RICHARDSON, A. W., F.R.E.S., 28, Avenue Road, Southall, Middlesex. *hym.*
- 1936 RICHARDSON, N. A., 20, Bletchley Road, Bletchley, Bucks. *l.*
- 1934 RIDEOUT, J. K., "Hodgsonites," Charterhouse, Godalming, Surrey. *ent.* (*Life Member.*)
- 1945 RILEY, J. A., 7, McKay Road, Wimbledon, London, S.W.20. *l, od.*
- 1908 RILEY, Capt. N. D., F.R.E.S., F.Z.S., 7, McKay Road, Wimbledon, London, S.W.20. *l.*
- 1910 ROBERTSON, G. S., M.D., "Struan," Storrington, near Pulborough, Sussex. *l.*
- 1946 ROCHE, C. G., 38, Saxinumdham Road, Aldeburgh, Suffolk. *hym.*
- 1942 ROCHE, P. J. L., M.R.C.S., L.R.C.P., F.R.E.S., c/o D.M.S., Lagos, Nigeria. *c, hem.*
- 1935 ROYFFE, D. W., 99, Hughenden Road, High Wycombe, Bucks. *c, ent.*
- 1932 RUDLAND, W. L., F.R.E.S., 211, Caversham Rd., Reading, Berks. *l.*
- 1932 RUSSELL, A. G. B., C.V.O., F.R.E.S., Lancaster Herald, "Scarbank," Swanage, Dorset. *l.*
- 1915 RUSSELL, S. G. CASTLE, Stokesay, Bridge Road, Cranleigh, Surrey. *l.*
- 1908 ST AUBYN, Capt J. G., F.R.E.S., 14, Purley Knoll, Purley, Surrey.
- 1945 SAUNT, J. W., A.L.S., 65, Victoria Road, East Cowes, I.O.W. *hym, ent.*
- 1927 SCOTT, Col. E., M.B., "Hayesbank," Ashford, Kent. *l.*
- 1923 SEVASTOPULO, D. G., F.R.E.S., c/o Ralli Bros., Ltd., Calcutta. (*Life Member.*) *l.*
- 1933 SHARMAN, F. W., 183, Star Road, Peterborough, Northants. *l.*
- 1945 SHAW, H. K. AIRY, F.R.E.S., Royal Botanic Gardens, Kew, Surrey. *c, hem.*
- 1938 SHERRIN, W. R., A.L.S., F.Z.S., South London Botanical Institute, 323, Norwood Road, Herne Hill, London, S.E.24. *c, l.*
- 1939 SIVITER SMITH, P., F.R.E.S., 21, Melville Hall, Holly Road, Edgbaston, Birmingham, 16. *l.*
- 1941 SMITH, Lieut. FDK. WM., R.N.V.R., Boreland-of-Southwick, by Dumfries, Kirkcudbright. *l, hym.*
- 1945 SMITH, F/Lt. M. W. P., 21, Shaftesbury Avenue, Bedford. *l.*

YEAR OF
ELECTION.

- 1939 SMITH, S. GORDON, F.L.S., F.R.E.S., "Estyn," Boughton, Chester.
ent.
- 1938 SNELL, B. B., F.R.E.S., "Woodsome," Bromborough, Cheshire. *l.*
- 1945 SOUTHGATE, B. J., F.R.H.S., Mithoma, St John's Road, Writtle,
near Chelmsford, Essex. *c, hem.*
- 1945 SPARROW, MRS M. J., 1, Anne Boleyns Walk, Cheam, Surrey. *l.*
- 1941 SPARROW, R. W., M.INST.R.A., 134, Regents Park Road, London,
N.3. *l.*
- 1943 SPREADBURY, W. H., 35, Acacia Grove, New Malden, Surrey.
- 1938 STAFFORD, A. E., "Corydonis," 83, Colborne Way, Worcester
Park, Surrey. *l.*
- 1927 STANLEY-SMITH, F., F.R.E.S., *Hon. Secretary*, "Hatch House,"
Pilgrims' Hatch, Brentwood, Essex. *l.*
- 1937 STEDALL, H. P. P., "Cherry Cottage," Prestwood, Great Missen-
den, Bucks. *ent.*
- 1940 STEEL, W. O., Redlands, Maidenhead Court, Maidenhead, Berks. *c.*
- 1935 STEPHENS, J. A., F.R.E.S., 44, Mount Road, Chatham, Kent. *c.*
- 1938 STERLING, D. H., 36, Estella Avenue, New Malden, Surrey. *l.*
- 1942 STIDSTON, Eng. Capt. S. T., R.N., F.R.E.S., "Ashe," Ashburton,
Devon. *l.*
- 1936 STIGANT, Miss B., 22, Brock Street, Bath, Somerset. *hortic. ent.*
- 1924 STOREY, W. H., Fairstead, Long Road, Cambridge. *ent.*
- 1945 STOUGHTON-HARRIS, G., M.A., F.C.A., F.R.E.S., 75, Mulgrave Road,
Sutton, Surrey. *ent.*
- 1931 STOVIN, G. H. T., M.R.C.S., L.R.C.P., 36, Wymondley Road, Hit-
chin, Herts.
- 1929 STUBBS, G. C., The Hall, Portishead, Somerset.
- 1939 SUMMERS, E. J., 30, Sutton Court Road, Sutton, Surrey. *c, hem.*
- 1934 SUTTON, GRESHAM R., 6, Kenilworth Gardens, Loughton, Essex.
l, c.
- 1945 SUTTON, R., 20, Ongar Road, Fulham, London, S.W.6. *l.*
- 1943 SWANN, E. L., 282, Wootton Road, King's Lynn, Norfolk. *c.*
- 1916 SYMS, E. E., F.R.E.S., F.Z.S., *Hon. Librarian*, 22, Woodlands
Avenue, Wanstead, London, E.11. *n, orth, od, t.*
- 1946 TALBOT, G., F.R.E.S., 31, York Road, Woking, Surrey. *ent.*
- 1942 TALBOT, M. J. R., c/o The Foreign Office, S.W.1. "By Beirut
Bag." *l.*
- 1913 TACHELL, L. S., F.R.E.S., "Rockleigh Cottage," Swanage, Dor-
set. *l.*
- 1941 TAYLOR, H. G. W., 11, Granville Road, Sidcup, Kent. *c.*
- 1934 TAYLOR, J. O., 64, Great Thrift, Petts Wood, Kent. *l.*
- 1925 TAYLOR, J. SNEYD, M.A., F.R.E.S., P.O. Box 23, Fort Beaufort, Cape-
Province, Union of S.A. *l.*
- 1944 TELSCH, THEODORE M., President, American Scientific Research
Society, 5219 Delancey Street, Philadelphia 43, Pennsyl-
vania, U.S.A. *c (elateroidea).*

YEAR OF
ELECTION.

- 1938 TETLEY, J., "White Cottage," Silverlea Gardens, Horley, Surrey. *ent.*
- 1931 THOMPSON, J. ANTONY, F.R.E.S., Sulby Hall, Welford, near Rugby, Staffs. *l, g.*
- 1946 THORPE, JOHN, 11, Egghill Lane, Northfield, Birmingham, 31. *l, c, b.*
- 1945 TIMMS, C., F.R.E.S., 524a, Mosely Road, Birmingham, 12. *d.*
- 1935 TOMPKINS, F. H., "Clifton," 18, Forest Side, Worcester Park, Surrey. *ent.*
- 1937 TONGE, A. E., F.R.E.S., "Ashville," Trafford Road, Alderley Edge, Cheshire. *l.*
- 1934 TUNSTALL, H. G., 11, St James Avenue, Ewell, Surrey. *l.*
- 1940 TURNER, A. D., 19, Manor Close, Kingsbury, London, N.W.9. *ent.*
- 1944 TURNER, H. J., 33, Pine Avenue, W. Southbourne, Nr. Bournemouth, Hants. *l.*
- 1943 TURNER, J. FINCHAM, 17, Litchfield Avenue, Morden, Surrey. *l, hym.*
- 1945 VALENTINE, ARTHUR, 2, Vicars Close, Wells, Somerset. *ent.*
- 1944 WAINWRIGHT, CHARLES, B.SC., F.R.I.C., 216, St Bernards Road, Olton, Warwickshire. *l.*
- 1889 WAINWRIGHT, COLBRAN J., F.R.E.S., 50, Christchurch Road, Bournemouth, Hants. *l, d.*
- 1929 WAINWRIGHT, J. CHAS., 9, Priory Road, Hook Road, Surbiton, Surrey. *l.*
- 1911 WAKELY, Sir LEONARD D., K.C.I.E., C.B., *Council*, 37, Marryat Road, Wimbledon, London, S.W.19. *l.*
- 1930 WAKELY, S., *Council*, 36, Stradella Road, Herne Hill, S.E.24. *l.*
- 1935 WALLIS-NORTON, Capt. S. G., R.A.S.C., 50, Christchurch Road, Winchester, Hants. (*Life Member.*) *ent.*
- 1944 WALTON, ANTHONY M., F.R.E.S., 275, Croxted Road, West Dulwich, London, S.E.21, and Hertford College, Oxford. *l.*
- 1936 WARRIER, R. E., "Birchwood," Birchwood Park Avenue, Swanley, Kent. *l.*
- 1939 WATKINS, N. A., M.A., F.R.E.S., Soldon, Druid Road, Stoke Bishop, Bristol, 9. *l.*
- 1945 WATKINS, O. G., F.R.E.S., 20, Torr View Avenue, Peverell, Plymouth. *l, od.*
- 1920 WATSON, D., "Crossways," Hightown, Ringwood, Hants. *l.*
- 1945 WATSON, R. W., South Haven, Stanley Road, Lymington, Hants. *l.*
- 1945 WEBB, HARRY E., 20, Audley Road, Hendon, London, N.W.4. *l.*
- 1945 WEDDELL, B. W., 13, The Halve, Trowbridge, Wilts. *ent.*
- 1928 WELLS, CLIFFORD, "Dial House," Crowthorne, Berks. *l.*
- 1911 WELLS, H. O., "St Hilary," 4, Boleyn Avenue, East Ewell, Surrey. *l.*
- 1937 WELTI, A., F.R.E.S., "Foxbush," Tillingdown Lane, Caterham, Surrey. *l.*

YEAR OF
ELECTION.

- 1945 WHEELER, A. S., 11, The Chase, Coulsdon, Surrey. *l.*
- 1911 WHEELER, The Rev. G., M.A., F.Z.S., F.R.E.S., "Ellesmere," Gratwicke Road, Worthing. Sussex. *l.*
- 1927 WHITE, A. GRANVILLE, F.C.A., "Hilltop," Chaldon, Surrey.
- 1945 WHITE, E. BARTON, M.R.C.S., L.R.C.P., F.R.E.S., St Merryon, Braunton, N. Devon. *l.*
- 1946 WHITEHORN, K. P., 205, Hither Green Lane, Lewisham, London, S.E.13. *l.*
- 1946 WILDRIDGE, W., 12, Church Mede, Frogmore, near St Albans, Herts. *ent.*
- 1945 WILLIAMS, E. F., F.R.E.S., "Warley Lea," Brentwood, Essex. *l.*
- 1925 WILLIAMS H. B., LL.D., F.R.E.S., "Croft Point," Bramley, Surrey. *l, g.*
- 1932 WILLIAMS, S. W. C., 17, Beresford Road, Chingford, London, E.4. *l.*
- 1938 WILLIS, J. R., "Vine Cottage," West Horsley, Surrey. *l.*
- 1946 WILLSHEE, C. J., 63, Daventry Road, Coventry, Warwickshire. *l.*
- 1945 WOOD, G. J., 72, Lincoln Avenue, Twickenham, Middlesex. *ent.*
- 1946 WOOLLISCROFT, J., 42, Holmbury Court, Tooting, London, S.W.17.
- 1926 WOOTTON, W. J., "Wannock Gardens," Polegate, Sussex. *l.*
- 1927 WORMS, The Baron DE, M.A., PH.D., F.R.I.C., F.R.E.S., M.B.O.U., Council, Westcroft, 26, Common Close, Horsell, Woking, Surrey. *l, orn.*
- 1945 WYKES, N. G., Carter House, Eton College, Windsor, Berks. *l.*
- 1944 YGLESIAS, H. R., B.A., 4, College Hill, Cannon Street, London, E.C.4. *l.*
- 1945 YOUDEN, GEORGE N., Vanessa, Shepherdswell, near Dover, Kent. *l.*

Members will greatly oblige by informing the Hon. Secretary of any errors in, additions to, or alterations required in the above addresses and descriptions.

COUNCIL'S REPORT FOR 1945-46.

Presented at the 74th Annual General Meeting of the Society, held at Burlington House, Piccadilly, London, W.1, on 23rd January 1946.

The outstanding event in the Society's year apart from the cessation of the second world war has undoubtedly been our removal from Southwark to Piccadilly. Towards the end there has been a rapid increase in membership, attributable in part to the cessation of hostilities, but more to the greater attractiveness of our new headquarters, to our scheme to publish papers on families of the micro-lepidoptera in our Proceedings, and to the two well-illustrated papers in the 1944/45 volume inaugurating the plan.

During the year our membership for the first time passed the 300 mark, and at 31st December 1945 stood at 330, made up of 4 Honorary, 4 Life, 237 Full and 85 Country Members. The three members who have been prisoners of war in the Far East have returned to this country safe and well. Those who were serving with the Armed Forces in Europe are being demobilized one by one, and so far we are thankful to say we have learned of no more casualties among them. Four members have died, 2 have resigned and 1 has been struck off for non-payment of subscriptions, while 46 new members have been admitted. Your Council must particularly record the sad loss the Society has sustained from the death of Mr F. D. Coote, a former President, who for several years up to the time of his death was active as organiser of our Field Meetings. He was probably as good a recruiting sergeant for the Society as we have ever known. We also have to announce with much regret the resignation from office, due to ill-health, of Mr J. H. Adkin, who for more years than most of us can remember has served us so efficiently as Honorary Lanternist. We wish him early recovery.

Your Council has completed its suggestions for the reorganisation among the officers begun last year. Mr Eagles was persuaded in the best interests of the Society to accept the office of Editor of *Proceedings*, a task for which his all-round knowledge admirably fitted him, while the Treasurership thus vacated was equally suitably filled by the appointment of Mr Henderson, his seat on the Council being filled by co-opting Mr H. R. Last. Lastly, Mr Hawkins, who agreed to take office as Minuting Secretary for the duration of the war in the emergency occasioned by the call-up of Mr Denvil, is resigning at the end of the year, and as there is no longer the same need for the duplication of records the Council proposes to leave the second Secretaryship vacant. The Society owes much to Mr Hawkins for filling the breach at a difficult time. It is hoped during the next year to find Assistants among the younger members to serve as understudies and afford some relief to the executive officers.

In February, as members will be aware, your Council most unexpectedly got notice to quit Southwark Chapter House within three months. Past experience showed that while it is easy to hire meeting halls, it is always difficult to get house room for our library and collections where they are accessible during meetings. This time the difficulty was aggravated by the shortage of accommodation in London due to the "blitz." In the emergency The Royal Entomological Society of London immediately offered the use of their rooms for meetings and storage for part of our equipment, and though it eventually proved unnecessary again to have recourse to their kindness we are nevertheless very grateful to that great Society for their kindly thought. Diligent search by members of the committee appointed for the purpose failed to find any alternative accommodation in Southwark or its neighbourhood. Working further afield, the President sought advice from the permanent Assistant Secretary of the Royal Society who, appreciating our predicament, was eventually able to obtain permission from his Council for us to hold our meetings in Burlington House from June onwards for one year certain, with the prospect of being allowed to stay on if we proved suitable occupants. Up to the present it has not been possible to obtain a room in the building in which access to our library* and collections is possible, but these have been stored in a dry room in the basement till such time as a suitable room can be provided. Your Council fully appreciates the inconvenience this causes to our members, but it is hoped that the situation will not persist. In any event, the only alternative would have been the storing of our furniture in a repository, at considerable cost to the Society, with the added risk of damage or deterioration. Your Council has felt it so advantageous that our highest officer should remain in office whilst these questions were still under consideration that in November they asked a Special Meeting, called for the purpose, for authority to nominate Capt. Jackson as President for a second year. This power was duly granted.

There is no doubt that the premises, with the well-furnished meeting room adequately equipped with epidiascope and screen, the large ante-room and comfortable committee room, afford us accommodation in a central situation superior to anything the Society has before enjoyed. In addition, we were allowed the use of the library for our Annual Exhibition. Our very grateful thanks are due to the President and Officers of The Royal Society for their most kindly and helpful attitude to us in a time of very great difficulty.

During the war we held not more than one Ordinary Meeting a month, but conditions had so far improved that it was decided after April to resume our constitutional practice of holding two meetings a month and to have all meetings, except the Exhibition, in the evening instead of holding winter meetings on Saturday afternoons. The inaugural meeting in Burlington House was on 13th June, when a con-

*Since the date of the Report this difficulty has been overcome and the Collection and Library are now accessible.

tingent of our Lancashire members came up and gave us an interesting paper on the Lepidoptera of their sandhills. The second meeting in July and both those in August had to be cancelled as The Royal Society needed undisturbed use of their premises while re-housing their library and portraits. In all 15 indoor meetings were held during the year, at which the average attendance was 31. Papers were read by Messrs Andrews, Spreadbury, Hulls, by Messrs Matthews and Fraser jointly, Mr Eagles, Dr Blair, Commander Harper, Capt. Riley and Messrs Bunnett, L. T. Ford, Classey and Last. The lantern has been used on five occasions.

The Annual Exhibition, the second meeting in October, was every bit as successful as was to be expected in a year exceptional for immigrant insects, which on this occasion were not confined to a few species of Lepidoptera but extended to other orders such as Odonata and Diptera. The attendance of 305 was a new high record from the time when our present form of exhibition was started in 1896.

During the year 13 field meetings were held, following the programme arranged by the late Mr Coote. The monthly visits to Ashted were continued with a view to the completion of local lists of the fauna and flora, and the records are being re-gathered by Mr Coulson with a view to publication. Other meetings at the usual places concluded with two fungus forays in October. The system of reporting the field meetings was changed during the year; instead of devoting two indoor meetings during the season to reading batches of reports, each field meeting has been reported at the next ensuing indoor meeting, so stimulating interest in field work and getting the reports supplemented before memory fades. With improving travel facilities it is hoped to revisit old localities and investigate new ones further afield next season.

Our Reunion Supper took place on 22nd January at the Connaught Rooms, when we were delighted to welcome back safe and well two of our three members who for over three years have been held prisoners of war in the Far East (the third at the last moment being prevented by illness from attending) and to entertain as guests the officers of The Royal Society who have been so helpful to us during the year. 99 members and guests sat down to supper, and short speeches, the circulation of pocket boxes, and a general conversazione filled a very pleasant evening.

The *Proceedings and Transactions* for 1944/45, published on 12th October 1945, consisted of xxvii plus 96 pages. The issue included the first two papers in our new series dealing with the families of the microlepidoptera, designed for re-publication eventually in collected form as a handbook for the sub-order. The first paper was by Mr S. N. A. Jacobs dealing with the genus *Lithocolletis*, the second by Mr S. Wakely covering the genus *Mompha*; each beautifully illustrated by a coloured plate painted by Mr Jacobs and reproduced by Messrs V. Siviter Smith & Co. Ltd. of Birmingham. The *Lithocolletis* paper was further illustrated by 51 text diagrams made from blocks generously provided by the

author. Other papers were illustrated by three black-and-white plates. The cost of printing and plates nowadays is high; the Publication and Illustrations Funds are always in need, and are specially commended to the generosity of members. Work on the Log Book for Micro-Lepidoptera, preparatory to publication, is continuing.

The Society has been much indebted to Mr A. W. Dennis for a succession of gifts throughout the year. In March he made us the handsome gift of a Crouch binocular microscope, which, with the smaller instrument presented some time ago, your Council decided should be available to members on loan. At the same time he handed over to us a great number of his fine lantern slides; these Mr Syms has overhauled and is incorporating with our own series. In addition he presented the following books:—Gilbert White's *Natural History of Selborne*, M. Maeterlinck's *The Life of the White Ant*, *English Names of our Wild Flowers*, *Epping Forest with Maps*, 12 volumes of the *Proceedings of the South London Entomological and Natural History Society*, H. M. Ward's *Grasses*, and Davis's *Mounting Microscopic Objects*.

The late Mr F. D. Coote presented 13 volumes of the *Proceedings and Transactions of the Royal Entomological Society of London*, together with Parts 2, 4 and 5 of its *Generic Names of British Insects*, as a further contribution from him towards completion of our set of the publications of that Society. Mr H. W. Andrews gave Shipley's *The Minor Horrors of War*; the author presented I. R. P. Heslop's *Check List of the British Lepidoptera with the English Names of each of the 2299 Species*; Mr J. Fincham Turner, Duncan's *Beetles, British and Foreign*; and Mr V. E. August, Dr E. B. Ford's new publication, *Butterflies*. The thanks of the Society have already been conveyed to the donors as the gifts have been received and announced.

The Curator reports that during the year many donations to the Society's collections have been made by members. Two interesting species of Lepidoptera for the British collection, a Wainscot *Sedina buettneri* Her. new to the British list and *Acrolepia assectella* Zell., an introduced pest on leeks, have been given respectively by Dr K. G. Blair and Mr W. L. Rudland. From Mr S. N. A. Jacobs and from the Ashby collection, continental Heterocera covering approximately 240 species have been received. The collection of the early stages of Lepidoptera has been enhanced by the donation of 22 larvae and many pupae by Sir Leonard Wakely and Mr F. J. Coulson. As regards the collection of British Coleoptera, 56 specimens covering 29 additional species have been donated by Messrs F. T. Grant, S. N. A. Jacobs, F. J. Coulson, H. Last, D. A. Odd and J. L. Henderson. As many of these gifts have not been announced on receipt, this opportunity is taken of according the thanks of the Society to the donors.

In view of the many exhibits and donations of species introduced or associated with commerce, it is proposed to allocate space in the cabinets for the formation of a representative collection of such species. During the greater part of the year little progress has been possible

with the collation and re-arrangement of any section, owing to the cabinets being inaccessible.

The Librarian reports that as the Library has been closed and inaccessible since our removal and the gifts thereto have been included in the Council's report, there is nothing further to report. He appends the list of additions by purchase and exchange.

Entomologist's Record, 1945; *Entomologist's Monthly Mag.*, 1945; *Entomologist*, 1945; *Essex Naturalist*, Vol. 27, Pt. 10; *Natural History* (New York), 1945; *Entomological News*, 1945; *Proc. of Royal Irish Academy*, Vol. 50B, 5-22; *Lloydia*, 1945; *Trans. and Proc. Torquay Nat. Hist. Soc.*, 1943-4; *South Eastern Naturalist*, 1944; *Trans. Wisconsin Academy of Science*, 1943; *Bedrug*, 1938-1944; *Proc. of Isle of Wight Nat. Hist. Soc.*, 1944; *Snakes of Mexico*; British Museum (Nat. Hist.), Acari; *Birds of Thailand*; *Report of British Association for Advancement of Science*; University of Asia, 41 separates; G. B. Buckton, *British Aphides*.

HON. TREASURER'S REPORT, 1945.

1945 was an expensive year for the Society, and I have some disappointment in presenting my first Report, which is not so favourable as that for the previous year. It has not been possible entirely to pay our way on the year's income, though the deficit is only £3 11s 3d.

We have again to thank many Members for small donations to the various Funds, as well as some of those serving in the Armed Forces for ignoring the fact that their Subscriptions were excused. One member, on being invalided from the Navy, sent me his dues for four years and a donation to the Publication Fund. Again, for the tenth consecutive year, the Illustrations Fund benefited by £20 from the same anonymous giver. I am sure we all wish him a very long life! That fund was also saved some depletion by the loan of the block for one of the plates in our *Transactions* by Mr Siviter-Smith, as well as by Mr Jacobs' generosity in providing the blocks for all the text figures in his paper on *Lithocolletis*.

BALANCE SHEET.

Our investments remain the same. Their market value at £1209 on 31st December 1945 was only £3 less than last year. This asset, if realised, would more than balance our Capital Fund.

The Cash position was not strong. At first sight it looks much the same as a year ago, but the Reunion Supper Account will, of course, have to be liquidated very shortly.

INCOME AND EXPENDITURE ACCOUNT.

The Subscription income was £145 7s 6d—£3 12s 0d more than in 1944. This does not show the full benefit of our increased membership since about three-fifths of the new members were elected after Michaelmas and their first payments are accordingly carried forward under Bye-Law 10 (b). On the debit side, two items are happily not of frequent occurrence, viz.: the printing of Bye-Laws and the cost of removal to Burlington House. Our change of headquarters is responsible also for most of the increase, largely postages, in the Secretarial Expenses. On the other hand there is a useful saving in Rent during the latter half of the year.

CAPITAL ACCOUNT.

Here is the brightest spot in our accounts for the year. The number of Entrance Fees for new members, viz. 56, amounting to £7, is a record since the Society was founded, the nearest approach to it being 55 in 1888. This sum goes automatically to the Library Fund.

LIBRARY FUND.

This Fund is now built up to £34 4s 9d, sufficient, I hope, to cover the cost of book-binding, so much of which our Hon. Librarian has been obliged to postpone in recent years, and to make useful purchases when opportunities arise.

PUBLICATION AND ILLUSTRATIONS FUNDS.

Both these Funds, after the first had received a grant of £30 from current revenue, were almost emptied in order to produce the 1944-45 *Proceedings and Transactions*.

I feel we cannot, and should not, rely on the great generosity of two or three members who have contributed so handsomely in the past, and would commend these Funds to the support of every member who is not already in the habit of making some small addition to his or her annual subscription, so that the high standard of our annual publication may be at least maintained.

We have to thank Messrs F. J. Coulson and H. G. Denvil for their labours in auditing the Accounts.

BALANCE SHEET at 31st December 1945.

Examined and found correct. 23rd January 1946.

F. J. COULSON,
H. G. DENVIL,

NOTE.—The Society's Books, Cabinets, Typical Collections, etc., are insured for £3000.

J. L. HENDERSON, Hon. Treasurer.

INCOME AND EXPENDITURE ACCOUNT—Year ended 31st December 1945.

Rent of Rooms	£42 7 6	Subscriptions (Arrears and Current)	£145 7 6
Insurance	3 8 6	Interest—	
Gratuities and Cleaning	2 0 0	£154 14s 0d 4% Consols	£6 3 8
Secretarial Expenses	34 16 3	£591 15s 3d 3½% Conversion Stock	20 14 2
Treasurer's Expenses	4 5 11	£100 0s 0d 3% Defence Bond	3 0 0
Removal	10 10 0	Deposit Interest	1 9 1
Printing Bye-Laws	8 19 6		
	£106 7 8		£31 6 11
Subscriptions to South Eastern Union of Scientific Societies, Wicken Fen Fund, Footpaths' Preservation Society, and Ramblers' Association	2 14 0	Less Income Tax	15 12 0
Annual Exhibition Expenses	12 18 6	"White Elephant" Sale	15 14 11
Grant to Publication Fund	30 0 0	Balance being Excess of Expenditure over Income, carried to Balance Sheet	2 6 6
Grant to Library Fund	15 0 0		3 11 3
	£167 0 2		

CAPITAL ACCOUNT—Year ended 31st December 1945.

Transfer to Library Fund	£7 0 0	Balance at 1st January 1945	£1084 5 11
Balance at 31st December 1945	1084 5 11	Entrance Fees	7 0 0
	£1091 5 11		£1091 5 11

LIBRARY FUND—Year ended 31st December 1945.

Purchases	...	...	...	£8 10 8	Balance at 1st January 1945	...	...	...	£21 15 5
Binding	...	...	...	1 0 1.	Entrance Fees	...	...	...	7 0 0
Balance at 31st December 1945	...	...	...	34 4 9	Grant from Income and Expenditure Account	...	...	...	15 0 0
				<u>£43 15 6</u>					<u>£43 15 6</u>

PUBLICATION FUND—Year ended 31st December 1945.

Printing and Posting the "Proceedings and Transactions"	...	...	...	£102 1 0	Balance at 1st January 1945	...	...	...	£50 2 0
Balance at 31st December 1945	...	...	...	2 0 0	Sales of "Proceedings"	...	...	...	13 3 0
				<u>£104 1 0</u>	Donations	...	...	...	5 11 0
					Interest on 3½% War Stock (Misses E. F. and L. M. Chapman)	£40 10s, less Income Tax	£5 5s	...	5 5 0
					Grant from Income and Expenditure Account	30 0 0
				<u>£104 1 0</u>					<u>£104 1 0</u>

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ILLUSTRATIONS FUND—Year ended 31st December 1945.

Blocks and Printing—					Balance at 1st January 1945	£32 11 3
Coloured Plates	...	...	...	£57 19 3	Donation given in 1944 towards cost of paper on <i>Lithocolletis</i> moths	...	...	...	10 10 0
Other Plates	...	...	...	4 18 0	Anonymous donation, and another	...	...	...	20 7 6
Balance at 31st December 1945	...	...	...	0 11 6					<u>£63 8 9</u>
				<u>£63 8 9</u>					

F. D. COOTE, F.R.E.S.

How many Naturalists are there who for one reason or another are quite unable to arouse in others any interest in Nature Study! Coote was an outstanding exception. His kindly disposition and the ease with which he could converse with people of all ages and classes enabled him to take advantage of a desire for knowledge of such things which is more widespread than is commonly imagined. To his work as an apostle of Natural History many individuals owe a lasting debt of gratitude for much happiness, and our Society owes a similar debt for many valuable members.

In guiding the affairs of the Society he took a full part, having served on the Council in 1936 and 1937, in 1939 and 1940, and 1943 and 1944. He was President in 1941 and a Vice-President in 1942, so that his six years continuous term of office covered most of the war.

At the outbreak of War in 1939 the Society had to consider whether it would carry on its activities or suspend them until the return of peace. There was much to be said for the latter course, especially as the Society was at the time without a meeting place and its belongings were stored. However, it was decided to keep going, and Coote, who was retired at the time, was able to devote himself to the task of supervising the work of getting the Society's belongings installed at the Chapter House. Nor did he stop at supervision. By taking charge of the War-time Field Meetings and leading most of them Coote made an important contribution to the maintenance of the continuity of the Society's work and rendered a lasting service. By his nature he was eminently fitted for the task in that all his life he had been a great lover of the open country and a tireless worker for others. Often his week-ends during the War were extremely busy, for not only had he the affairs of our Society to occupy him, but there was also his local Allotment Society, for which he undertook many onerous tasks as part of his contribution to the War effort.

Perhaps his greatest achievements in altruistic work were in connection with the Scout movement, to which he devoted many years of hard work and in which he held important offices. His companions on Field Meetings were well aware of his interest in young people for often he would leave the party for a while to lend a helping hand to passing boys. In the last year of his life he was giving practical lessons in entomology to a group of boys living in the neighbourhood of his home and would speak with pride of their successes.

Another of his contacts was the Ramblers' Association, and it was through him that our Society's affiliation to that body was arranged.

To the end this tall spare man so well known and loved by our members was able to keep pace and to work with his younger friends. In the early years of the century he was a member of the A.B.C. Club, a

band of S.E. London entomologists whose names suggested the title of the Club. There were S. R. Ashby, P. H. Barker and his two brothers, their cousin A. W. Burgess, F. D. Coote, and E. J. Crow. They used to meet at each others' houses and collect in the localities we frequent to-day, as well as in places such as Wimbledon Common and Epping Forest, which are perhaps not so popular nowadays. It is sad to think that the little band was broken up by the 1914-18 War.

Coote retired from the service of Lloyd's Register several years ago. He joined our Society in 1907 and was elected a Fellow of the Royal Entomological Society in 1921. He died on 8th October 1945 after a short illness. He left a widow, a son, and a daughter to whom we extend our deep sympathy.

T. R. E.

ABSTRACT OF PROCEEDINGS.

INDOOR MEETINGS.

10th FEBRUARY 1945.

The President, Capt. R. A. JACKSON, R.N., in the Chair.

It was announced that Cpl. T. G. Howarth, B.E.M., F.R.E.S., still a P.O.W. in Korea, is alive, well, and receiving Red Cross Parcels, according to a card received recently by Dr E. A. Cockayne.

Mr H. W. ANDREWS exhibited series of Diptera to illustrate points in his paper subsequently read.

Mr S. N. A. JACOBS exhibited various Coleoptera found in imported commodities, which he was presenting to the Society for the "foreign drawer," but for security reasons he was unable to announce the names of the insects.

Mr E. E. SYMS showed the Society's Reports and Balance Sheets for 1876 and 1877, the property of the Essex Field Club, of which there were no copies in our own Library, where, however, typed copies were being placed.

Mr L. T. FORD exhibited 6 cased larvae of the Tinaeid moth, *Narycia marginepunctella*, Steph., 4 being in their 1st year and 2 in their 2nd year.

Mr T. R. EAGLES exhibited sprays of the following conifers:—(a) *Juniperus chinensis*, L., with juvenile (prickly) and adult (blunt) foliage—mostly adult, and drew attention to the terminal male cones. (b) *Cupressus sempervirens*, L., the Italian Cypress. (c) *Cupressus lawsoniana*, Murr., and *Thuya plicata*, D. Don, and drew attention to the facts that while the foliages are hard to distinguish, the Cypress cones are round while the *Thuya* cones are long. (d) *Sequoia gigantea*, DC., "Big Tree," and mentioned that in the other *Sequoia*, i.e., *S. sempervirens*, the "Redwood," the leaves spread in two ranks (pinnate).

Mr ANDREWS then read his paper on "Some External Aspects of the Bodies of Diptera," with references to his exhibit (see *Trans.*). After questions had been answered, a hearty vote of thanks was moved from the chair and carried by acclamation.

10th MARCH 1945.

The PRESIDENT in the Chair.

Mr Alan Patrick Howard, of 19 Limes Avenue, Mill Hill, London, N.W.7, was declared elected a member.

It was announced that Mr D. F. Eastmure had joined H.M. Forces.

It was also announced that Mr A. W. Dennis had presented the Society with a binocular microscope and numerous lantern slides and

that Mr Adkin had had the microscope case repaired. A very hearty vote of thanks for this generous gift was carried by acclamation.

The Rev. Canon T. G. EDWARDS exhibited an extreme melanic form (ab. *merularia*, Weym.) of the Lepidopteron *Erannis leucophaearia*, Schiff., taken recently at Ashted, with more normal examples for comparison.

The Curator, Mr COULSON, showed sets of early stages of Lepidoptera and appealed to members for others to add to the Society's collections. He said that a full list of desiderata would shortly be available.

Mr STANLEY N. A. JACOBS exhibited a sheet of silk stripped from the ceiling of a grain store, made by the single threads from crawling larvae of the Micro-Lepidopteron, *Ephestia elutella*, Hb. The sheet was quite opaque and nearly white.

Mr L. T. FORD exhibited cases of the Micro-Lepidoptera, *Solenobia inconspicua*, Staint., and *Borkhausenia panzerella*, Steph., from Bexley.

The BARON DE WORMS exhibited 1 male and 4 females of the Lepidopteron, *Procus (Miana) versicolor*, Bkh. (Rufous Minor), first identified as British in 1936, and said: "The specimens in question were definitely confirmed as to identity by Mr W. H. T. Tams, who kindly examined their genitalia. The species must be very widespread and only requires identification in collections. The above individuals were taken over such a wide range as the new Forest, Kent, Malvern and Somerset. The lighter coloured specimens exhibited the chief characteristics of the species, the reddish ground colour and clearly outlined stigmata on a darker ground. This feature is a main distinction from *P. strigilis*, L., and *P. latruncula*, Schiff."

Mr R. W. SPARROW exhibited varied specimens of *E. leucophaearia* from Scratch Wood, also larvae of the Micro-Lepidopteron, *Teichobia verhuellella*, Staint., feeding on *Asplenium* taken at Llandego in the Wye Valley.

The CORRESPONDING SECRETARY read extracts from a letter from our member, Mr Sterling, serving with the M.E.F., describing his collecting activities.

Mr W. H. SPREADBURY then read his paper, "Nature Rambles with a Camera," profusely illustrating it with many beautiful lantern slides (see *Trans.*). A very hearty vote of thanks was moved from the Chair and carried with acclamation.

14th APRIL 1945.

The PRESIDENT in the Chair.

The deaths of a member, Mr H. E. Page, and of a former member, Mr E. C. Bedwell, were announced; also that the Society for British Entomology was reviving its activities; and that the staff of the Botanical Gardens at Kew were appealing for help in drawing up a complete bibliography of the British Flora.

Messrs John Wilson Moore, F.R.E.S., Middleton Dene, 151 Middleton Hall Road, Kings Norton, Birmingham, 30; Alexander Steven Corbet, D.Sc., Ph.D. (London), F.R.I.C., 59 Alexandra Road, Reading, Berks; Richard S. Balter, F.R.E.S., 18 Ferncroft Avenue, London, N.W.3; Robert Sutton, 20 Ongar Road, Fulham, London, S.W.6; Stanley Charlson, 112 Manchester Road, Tyldesley, Manchester; and John Allen Freeman, B.Sc., Ph.D., A.R.C.S., F.R.E.S., The Lord Roberts Hut, Bisley Camp, Brookwood, Woking, Surrey, were declared elected as members. Mr Alan P. Howard signed the Obligation Book and was admitted a member.

Mr A. W. DENNIS showed a photograph depicting the use of camouflage by larvae in the first instar of the White Admiral butterfly, *Limenitis camilla*, L. When hatched the larva eats the tip of the leaf but not the mid-rib, and fastens frass to the mid-rib by threads, also impales frass on its dorsal spines.

Mr SYMS, by permission of the Curator of the Essex Museum, exhibited aberrations of the moth, *Spilosoma (Diacrisia) lutea*, Hufn., from the collection of the late Mr A. W. Mera, including abb. *zatima*, Stoll., *intermedia*, Bang-Haas, *totinigra*, Seitz, *fasciata*, Tugwell, *guerinii*, Lamb., *fasciata*, Dufresne, *eboraci*, Tugwell, *unicolor*, Homberg, and *paupera*, Hofman. Dr Kettlewell agreed that the insect had gone out of fashion; ab. *zatima* is produced by a key gene with multiple modifiers, and always gives trouble in rearing owing to a virus in the 2nd or 3rd generation.

Mr S. N. A. JACOBS, for comparison with the silken sheet made by *Ephestia elutella*, Hb., exhibited last month, showed the matted ropes produced by the micro-lepidopteron, *Ephestia künniella*, Zell. These were taken from the chutes in flour mills, which in consequence have to be fumigated annually. He also drew attention to an included beetle, *Gnathocerus cornutus*, F., another pest of the mills. He also presented to the Society a number of European moths.

Dr G. V. BULL sent for exhibition and retention by any interested member three specimens of an Ichneumon which for the first time he had bred from last year's larvae of the moth, *Lasiocampa trifolii*, Schiff.

Captain R. A. JACKSON showed larvae in 2nd and 3rd instar of the hybrid moths, *Poecilopsis lapponaria*, Bdv., ♂, × *Lycia hirtaria*, Cl., ♀, = hybr. *leesi*, Harrison, and *L. hirtaria*, ♂, × *P. lapponaria*, ♀, = hybr. *wallacei*, Harrison, and mentioned that the latter cross was the more difficult to procure and that the larvae were growing more quickly. He also showed ova of the moth, *Nothopteryx polycommata*, Schiff., yellow when first laid, but turning reddish pink in about three days.

Mr FINCHAM TURNER exhibited ova of the moth, *Xylocampa areola*, Esp., and Mr W. J. FINNIGAN showed others which had not yet developed their beautiful markings.

Mr WAKELY exhibited the living moth, *Hemerophila abruptaria*, Thnbg.

Mr S. R. BOWDEN showed living specimens of the butterflies, *Lycaenopsis argiolus*, L., and *Hamearis lucina*, L.

Mrs ASHBY sent 3 store boxes of Lepidoptera and 2 of Coleoptera from her late husband's collections for distribution among members.

10th MAY 1945.

The PRESIDENT in the Chair.

Following on the recent gift of a binocular instrument by Mr Dennis, the Council had decided to make the Society's microscopes available for home use by members. Written applications, stating the intended use and probable duration for which required, were invited.

Messrs P. Blasdale, Brooklyn, The Ash, Wombwell, Yorks; H. W. Adams, 10 Ramillies Place, W.1, and of Kettering, and K. J. Monks, 12 Hugh Mews, Westminster, S.W.1, were declared elected members.

Mr EAGLES exhibited the floating form of the Hepatic, *Riccia fluitans*, L., and mentioned that this form is distinct from all other British liverworts, whereas the terrestrial form of the species is similar to the other species of *Riccia*. He also showed larvae of the moth, *Theria rupicaprarica*, Hb.

Col. CARDEW exhibited a dark brown unicolorous aberration of the moth, *Ectropis bistortata*, Goeze, from Box Hill, Surrey, with other specimens, including ab. *delamerensis*, White, for comparison.

Dr K. G. BLAIR exhibited a living specimen of the Hymenopteron, *Perilitus coccinellae*, Schrk. (Braconidae) emerged this day from a cocoon found attached to a moribund *Coccinella 7-punctata*, L., in his garden on 5th May, and referred to *Ent. Mo. Mag.*, 1945: 51-52.

BARON DE WORMS exhibited a living specimen of the Wasp-beetle, *Clytus urietis*, L., from North Kent; also of the moth, *Gonodontis bidentata*, Clrck., taken in Hampstead (London) to-day. Remarks on the season, as shown by the Lepidoptera, were contributed by various members. Baron de Worms reported it as abnormally early; *Abraxas grossulariata*, L., has already pupated; he had seen an imago of *Triphaena pronuba*, L., on 8th May; larvae of *Limenitis camilla*, L., are already full fed in the wild. Capt. Jackson remarked that the early Spring emergence had been interrupted by the cold snap, so that *Argynnis euphrosyne*, L., had emerged a month ago, and there had been a fresh emergence this week. Mr Welti reported seeing an imago of *Apamea crenata*, Hufn. (actually the red-tinged brown form, *nigro-rubidea*, Tutt). Imagines of *Apatele rumicis*, L., were reported from the Field Meeting on 15th April, and elsewhere about the same date. On the other hand, Mr Andrews reported extreme scarcity of insects during the cold week of his first war-time holiday, ended on 5th May. As regards immigrant Lepidoptera, Mr Eagles reported *Vanessa cardui*, L., flying in North London, and Dr Blood reported it at Eltham (South East London). A tattered specimen of *Celerio livornica*, Esp., was reported from Eastleigh, Hants, this week, four others from Surrey and Wiltshire, and

another from St Mawes, Cornwall. Capt. Jackson recorded an elusive specimen of *Macroglossum stellatarum*, L., in Hampshire.

Mr HULLS being unable to attend, his paper, "The Louse in Literature" (see *Trans.*) was read for him by the Secretary. The President expressed the great debt the sailor and soldier owe to entomologists for their measures against lice and the resultant prevention of disease. Prof. Buxton, whose important book had just been mentioned, had visited the Near East on preventive work only this year. Mr Welti referred to Prof. Arthur Shipley's classic of the last war, "The Minor Horrors of War," and Mr Eagles to the British Museum's small publication. Mr Syms remarked on the comparative difficulty of getting the Crab-louse and said that there was very little literature dealing with it.

24th MAY 1945.

The PRESIDENT in the Chair.

The deaths of a member, Mr R. A. R. Priske, and of a former member, Dr Kemp, the marine biologist, were notified.

It was announced that Mr T. R. Eagles had been appointed *Hon. Editor of Proceedings* to fill the vacancy caused by the resignation of Mr Hy. J. Turner, and that Mr J. L. Henderson had been appointed *Hon. Treasurer* in place of Mr Eagles. Messrs S. W. C. Williams and R. M. Lang, A.C.A., were asked to audit the accounts on the change of Treasurer.

Capt. JACKSON exhibited (a) larvae of the moth, *Endromis versicolora*, L., in their second instar, from Aviemore ova which hatched on 13th May; (b) larvae of the moth, *Cleora cinctaria*, Schiff., in their second instar, from Struan ova which also hatched on 13th May; (c) a full-fed larva of the moth, *Eilema deplana*, Esp., obtained at Bishops Waltham, Hampshire, on 22nd May from yew; (d) ova of the moth, *Cerura vinula*, L., laid on aspen, from Brentwood, Essex; (e) a pupa of the butterfly, *Aglais urticae*, L., from which had emerged 4 or 5 parasites, leaving nothing but the empty shell; and, on behalf of BARON DE WORMS, a number of lepidopterous wings obtained from a small cave at Aviemore. He thought the moths had fallen victims to a bat.

Mr HARRY MOORE exhibited a larva of the moth, *Cossus cossus*, L., which, taken in Devonshire last September, had at some time since eaten its way out of the containing cardboard box and partly devoured a dead hornet stored nearby.

Dr K. G. BLAIR exhibited galls of the Dipteron, *Lipara ruftarsis*, Lw. (Chloropidae), on the Common Reed, from Beer, S. Devon, with flies emerging from them. He said that the Reed was growing in damp patches on the undercliff; right down to the beach, and that the locality was about the only one recorded for this scarce species in this country; also the various species of parasites of the common *Lipara lucens*, Mg., and inquilines in the galls, reared from a particularly rich parcel of the galls sent him by our member, Mr E. L. SWANN, from King's Lynn, Norfolk, and mentioned at our meeting of 8th June 1944, including

Pimpla detrita, Holmgr. (Ichn.), *Polemon liparae*, Gir. (Bracon.) and *Stenomalus liparae*, Gir. (Chalc.), parasites of the *Lipara*; *Haplegis flavitarsis*, Mg. (Dipt.) and *Perrisia inclusa*, Frfld. (Dipt.),inquilines in the gall; *Prosopis pectoralis*, Foerst. (Hym. Acul.), a rare bee known only from the Fen district, which was nidificating in the vacated galls; *Gasteruption assectator*, L. (Hym. Evanidae), a parasite of the bee; and *Steingelia gorodetskia*, Nasson. (Hem. Coccidae), of which the female shelters among the reeds for the production of its ovisac (see *Ent. Mon. Mag.*, 80, p. 189 (1944)).

Mr C. N. HAWKINS exhibited larvae of the Lepidopteron, *Mesotype virgata*, Rott, bred *ab ovis* from a female taken at Burnham-on-Sea, Somerset, on 19th April 1945. The eggs were laid 19th-21st April 1945 and hatched about 5th-7th May 1945.

Mr T. R. EAGLES exhibited foliage of the smooth-leaved Elm tree, *Ulmus nitens*, Moench, and drew attention to differences as compared with the Wych Elm, *U. glabra*, Hudson, notably that the leaf blade commences much further down the stalk on one side than the other.

Sir LEONARD WAKELY exhibited a larva in the second instar of the moth, *Saturnia pavonia*, L., to show the difference in appearance as compared with the later instars; also eggs thought to be of a Hemipteron.

Mr J. A. STEPHENS exhibited Coleoptera: (a) *Grammoptera holomelina*, Pool, 2 specimens taken at Chatham, Kent, on 10th May 1945, while beating Hawthorn blossom and another taken at the same place on 22nd May 1945; (b) *Burypithes pellucidus*, Boh., thought to be the first specimen of the species recorded from the Chatham, Kent, district, found among *Brassica* seedlings; (c) *Elatér balteatus*, L., beaten from Oak at Cobham, Kent, on 5th May 1945, thought to be the second record for the district; (d) *Conopolpus testaceus*, Ol., beaten from Oak in Cobham Park, Kent, on 19th May 1945.

13th JUNE 1945.

Meeting held in the Rooms of the Royal Society, Burlington House, Piccadilly, London, W.1.

The PRESIDENT in the Chair.

The President opened by expressing the gratitude of members to the Royal Society for its courtesy and help.

Messrs J. A. Riley, 7 McKay Road, Wimbledon, S.W.20; J. L. Hamerton, 11 Linkway, S.W.20; and H. E. Hinton, B.Sc., Ph.D., F.R.E.S., British Museum (Natural History), London, S.W.2, were declared elected members.

The PRESIDENT exhibited a varied series of *Cleora cinctaria*, Schiff., including an albino female from Struan, Perthshire.

Mr L. T. FORD showed cocoons of *Nepticula decentella*, H.-S., from Bexley, Kent.

Lieut. D. H. STERLING had brought from Palestine the moths, *Saturnia pyri*, Schiff., and *Pachyposa otus*, Drury. The latter was

reared in classical times for its silk, but had now given way to species introduced from the Far East.

Mr W. H. SPREADBURY referred to the fact that robins regurgitate pellets as do owls. He showed two pellets; one had been cast up by the robin while standing at Mr Spreadbury's feet.

Mr R. J. BURTON exhibited specimens of the Neuropteran, *Chrysopa septempunctata*, Wesm., reared from eggs which he had shown at the meeting of 13th July last.

Commander G. W. HARPER, R.N., exhibited moths and larvae from Scotland, including *Anarta cordigera*, Thnbg.

Major H. S. FREMLIN exhibited a large queen termite from West Africa and the much smaller males.

Mr A. BLISS showed larvae recently collected in N. Devon, including that of *Iodia croceago*, F.

Mr T. R. EAGLES exhibited a living female of *Hemerophila abruptaria*, Thnbg., ab. *brunneata*, Tutt, taken at Enfield, Middlesex.

Mr STANLEY-SMITH exhibited imagines of the moths, *Agrotis vestigialis*, Rott, from Studland, Dorset, from South Devon, and from Suffolk, and of *Agrotis ripae*, Hb., from Studland, Dorset, from South Devon, and from Norfolk, for comparison with those illustrating the paper of the evening.

The BARON DE WORMS showed larvae of *Actebia praecox*, L., from the Lancashire sandhills, and read the following note:—"These larvae are to be found in good numbers in this locality, especially on patches of dwarf Sallow (*Salix repens*) in the immediate proximity of the dunes bordering the shore. The best method of obtaining them by day is to scratch round the outer edges of the beds of the Sallow when the larvae will be unearthed from the sand in which they bury themselves just beneath the surface. The form of the moth in this region is particularly large and bright, whereas that from the Dorset coast is much smaller and duller, while the type from N.E. Scotland is generally darker in tint. As to its general distribution, the insect does not appear to occur in the South Eastern Counties, viz., Kent, Sussex, etc., but is known to occur locally along the coast from Dorset to Cornwall, thence north through Wales and Lancashire to Western Scotland. In the East it appears in Norfolk, even inland on the Breck sand—an old coast line—thence northwards to Aberdeen and Forres in Scotland."

Mr J. K. MATTHEWS then showed an extensive selection of Lepidoptera from the Lancashire sandhills, also Coleoptera, lepidopterous larvae, and plants, including the following: *Celerio galii*, Rott., *Celerio livornica*, Esper, *Deilephila porcellus*, L., *Deilephila elpenor*, L., *Cerura hermelina*, Goeze, *Cerura vinula*, L., *Pheosia tremula*, Clerck, *Pheosia gnoma*, F., *Notodonta zizzac*, L., *Notodonta dromedarius*, L., *Dasychira fascelina*, L., *Euproctis chrysorrhoea*, L., *Leucomia salicis*, L., *Lasiocampa quercus*, L. (*callunae*, Pal.), *Lasiocampa trifolii*, Schiff., *Phylodoria potatoria*, L., and vars., *Tethea duplaris*, L., *Apatele leporina*, L., and vars., *Actebia praecox*, L., *Xylophasia monoglypha*, L., and vars.,

Eumictis lichenea, Hb., *Hydraecia oculatea*, L., *Gonodontis bidentata*, Clerck, and ab. *nigra*, Prout, *Phigalia pedaria*, F., and var. *monacharia*, Stdgr., *Cleora repandata*, L., *Erannis marginaria*, Borkh., *Anaitis plagiata*, L., *Carsia paludata*, Thunb., *Euphia bilineata*, L., *Hydriomena coerulata*, F., *Hydriomena ruberata*, Frey., *Euchoecia nebulata*, Hb., *Semiothisa liturata*, Clerck, *Biston betularia*, L., *Polyommatus icarus*, Rott. Living Larvae—*Lasiocampa trifolii*, Schiff., *Actebia praecox*, L., *Leucoma salicis*, L., *Nyssia zonaria*, Schiff. (Conway). Coleoptera—*Criocephalus rusticus*, L., *Carabus nitens*, L., *Aromia moschata*, L., *Cicindela hybrida*, L. He then read on behalf of Mr G. DE C. FRASER and himself a paper on the "Lepidoptera of the Coastal Sandhills of Lancashire" (see *Trans.*). A discussion followed, and questions were answered by Mr Fraser and Mr Matthews.

27th JUNE 1945.

At the Rooms of the Royal Society, Burlington House, Piccadilly, London, W.1.

The PRESIDENT in the Chair.

The following new members were elected:—Dr John Newton, M.R.C.S., L.R.C.P., of Alconbury Hill, Huntingdon, and Mr W. H. Jackson, of Northroak Cottage, Lyndhurst, Hants.

It was announced that Mr H. R. Last had been co-opted to the Council to fill the existing vacancy.

Mr S. N. A. JACOBS exhibited the degenerate dipteran, *Stenepteryx hirundinis*, L., from Westerham, Kent, parasitic on martins.

BARON DE WORMS exhibited (1) *Plebejus argus*, L., var. *cretaceus*, Tutt, male and female, Eynsford Downs, Kent, 26th June 1945. He remarked that this large and bright form seems to be confined to a few restricted localities on the Kent Downs. (2) Short series of the moths, *Procus latruncula*, Schiff., from various localities. These had been determined by genitalia. Anyone able to collect at night at this time of year should be on the look-out for this and for *P. versicolor*, Bkh., which had no doubt often been passed as *P. strigilis*, L. (3) Blooms of the Bee Orchis (*Ophrys apifera*, Huds.) and the Pyramidal Orchis (*Orchis pyramidalis*, L.).

Mr W. J. FINNIGAN showed larvae of the butterfly, *Vanessa cardui*, L., from Cheam, Surrey.

Mr H. R. LAST exhibited (1) The Coleopteron, *Lesteva luctuosa*, Fauv. "This is perhaps the rarest of the seven species of the genus. It was recorded by Donisthorpe as a new species to Britain (*Ent. Record*, 1911), having taken a single specimen on the Isle of Eigg off the N.W. Scottish coast on 17th September 1911. This is recorded in Fowler and Donisthorpe's *Supplement* (p. 339), where it also states that M. Fauvel speaks of the species as found very rarely under refuse and stones, half-submerged on the borders of torrents in the mountains. This rather circumscribed habitat is confirmed by my capture, which was beneath

a stone in a trickle of water down the rocks on the coast at Aberdeen on 14th May 1945." (2) The Coleopteron, *Myllaena gracilicornis*, Fairm. "For some long time a single specimen taken by Fowler at the foot of a small waterfall near Ventnor, Isle of Wight, was unique as British, but Mr Donisthorpe has since taken it elsewhere. Joy has not included it in his *Handbook* with three other species of the genus for lack of sufficient material. This specimen I took at Bow, Devon, on 8th April 1944 in moss." (3) Set specimens and living examples of the dipteran, *Stenepteryx hirundinis*, L.

Commenting on the last exhibit, Mr E. E. SYMS gave a brief account of this and other species of flies infesting birds and their nests.

Mr H. W. ANDREWS drew attention to a peculiarity of the parasitic fly, *Orthomyia avicularia*, L. In addition to running forwards, it can and does every now and again run sideways almost as quickly as it goes forwards.

A number of members joined in a discussion on the season. It was thought by some to have been at first a very early season, followed by a severe check due to a cold spell after which some insects emerged later than usual. Members described their collecting experiences.

The PRESIDENT said that at Dungeness, Kent, the moth, *Hadena albimacula*, Bkh., had been found by him in the full glare of the sun and exposed to a strong wind, and not in shade or shelter.

Mr LAST and BARON DE WORMS spoke of the Black Redstart and its song. This bird (*Phoenicurus ochrurus gibraltariensis*, Gm.) occurs in London bomb sites.

Preliminary reports of the first seven Field Meetings of the 1945 Season were read by or on behalf of the respective leaders.

11th JULY 1945.

The PRESIDENT in the Chair.

The following new members were declared elected:—Captain M. G. Fraser, of 71 Boldmere Road, Eastcote, Pinner, Middlesex; Miss C. de C. Fraser, of Warren Mount, Freshfield, near Liverpool; and our former member, Mr E. J. Bunnnett, M.A., of 46 Redstone Park, Redhill, Surrey, on rejoining.

The PRESIDENT exhibited larvae of *Scopula immorata*, L., hatched from ova laid on 12th June by a female taken near Lewes, Sussex.

Canon T. G. EDWARDS showed (1) a larva of *Eilema caniola*, Hb., and (2) ova of *Panaxia dominula*, L., both from Cornwall.

BARON DE WORMS exhibited (1) A melanic female (alive) of *Xanthorhoë fluctuata*, L.; taken at Woking, Surrey, on 4th July 1945. The hindwings were extremely dark and the forewings deep grey. It differed from the Scottish and Shetland races. Mr C. N. HAWKINS said he had taken an apparently similar insect, also a female, at Wimbledon in 1942 (see our *Proc.*, 1943/44, p. 15). (2) Fourth instar larvae of *Apatele menyanthidis*, View., from Aviemore, Perthshire. He said

that the Scottish race of the imago is much paler grey than those from N. England. The insect bears a strong protective resemblance to the rocks on which it rests. (3) Larvae of *Apatele euphorbiae*, Fb., var. *myricae*, Gn., fourth instar, also from Aviemore. These were feeding on swallow. He said that specimens from Aviemore have much more blue in their grey colour than those from Rannoch, Perthshire. Specimens from Western Ireland are much darker grey. This insect also bears a remarkable resemblance to the rocks.

Mr S. N. A. JACOBS exhibited the bug, *Reduvius personatus*, L., from Whitstable, Kent. It is a predator on the bed bug.

Mr T. R. EAGLES showed the plant, *Galinsoga parviflora*, Cav., found colonising a London bomb site.

Dr K. G. BLAIR exhibited a box of the Marble Gall of the Oak, *Cynips kollari*, Hart., and read notes on some of the insects reared from them (see *Trans.*) in an attempt to allocate the various parasites to their respective hosts. The latter were isolated by opening the galls during the winter and sorting them according to the cells contained. These were of three types: (1) A single round central chamber formed by the gall-maker, with its parasite, *Torymus regius*, Mayr (*devoniensis*, Parf.). (2) A group of about 10 cells which frequently replaced the single chamber of (1) and which produced the inquiline, *Synergus reinhardi*, Mayr, and numerous parasites. The presence of this inquiline is, of course, fatal to the *Cynips*. (3) Isolated cells in the peripheral tissue of the gall, occurring both with the *Cynips* and with *S. reinhardi*, apparently without detriment to either. From these were reared *S. melanopus*, Mayr, and parasites. Further species of inquilines recorded from the galls have not yet been identified with their cells, nor have any of these parasites been established as hyperparasites, as some probably are. Other insects reared included the Tortricid, *Pammene gallicolana*, Zell., the larva of which feeds on the gall substance, the Hemerobiid, *Symphorobius pygmaeus*, Ramb., of which the larva spins up in the empty gall, and the Sphecid, *Rhopalum clavipes*, L., which nidificates in them.

Mr V. E. AUGUST exhibited eggs of *Vanessa atalanta*, L., and of *Aglais urticae*, L. The former were laid singly on nettle, the latter in a cluster.

Col. P. A. CARDEW exhibited a yellow-banded aberration of *Aglais urticae*, L., bred from Wimbledon larvae.

Mr W. H. SPREADBURY exhibited young plants of Bracken, *Pteridium aquilinum* (L.), Kuhn. Young plants from spores are not often seen. Bracken usually spreads by vegetative means. He drew attention to the marked difference between these young fronds and the familiar adult frond.

Preliminary reports were read of the Ashted and Benfleet Field Meetings and of the Congress at Harpenden of the South Eastern Union of Scientific Societies.

Mr T. R. EAGLES read a paper on the " Physiology of Insects " (see *Trans.*). Some discussion followed, and a hearty vote of thanks was moved from the Chair and carried by acclamation.

12th SEPTEMBER 1945.

The PRESIDENT in the Chair.

The following new members were declared elected :—Professor G. D. Hale Carpenter, M.B.E., D.M., of Oxford, and Arthur Valentine, of Overleigh House, Street, Somerset.

The death of Major H. D. Smart, R.A.M.C., was announced.

Mr C. N. HAWKINS, on behalf of Dr K. G. BLAIR, exhibited stems of the Common Reed, collected at the Benfleet Field Meeting on 8th July, galled by the Cecidomyiid fly *Perrisia inclusa*, Frfld., and read the following note: " These galls are often found in association with the large galls on the reed formed by the Chloropid, *Lipara lucens*, Mg., but the *Lipara* seems to be absent from the Benfleet reed beds while the *Perrisia* galls are abundant. They are found as cocoon-like swellings in the lumen of the straight internodes of the reed, and are indicated outwardly by a somewhat obscure scar. Before the emergence of the fly the pupa, by means of the strong sharp armature of the head, tears its way through the stem and wrapping leaf-sheaths at this scar to the outside and projects from the reed, retaining its hold only by the tail end being caught in the torn fibres of the stem. They were well figured by Dr J. Waterston, 1922, but erroneously as Chalcid pupae associated with *Nonagria dissoluta*, Treit. That they are really the Cecid pupae has already been pointed out by me (1944). The Cecids began to emerge a few days later, but the parasites did not make their appearance until the end of the month, when they were in great numbers. The most abundant was a small black Proctotrypid, *Platygaster vestinus*, Walk. (det. C. Morley) (?=*phragmitis*, Schin. of Giraud (1863), a multiple parasite). Next in numbers was a brilliant green Chalcid with yellow legs, *Tetrastichus arundinis*, Gir. (the *Geniocerus flavimanus*, Thoms., of Waterston). Somewhat less numerous was the Eurytomine, *Decatoma mellea*, Curt., a relatively large yellow species marked with black, apparently not found by Giraud. Of *Torymus lasioptera*, Gir., there were only some half-dozen examples, and one each of two other species, a *Eutelus* sp. and an *Aprostocetus* sp., all apparently solitary parasites. The emergence holes of the Chalcids are neat round holes in the stem of the reed, independant of the scars, very different from the ragged holes torn by the Cecid pupae." *References*:—Giraud, G., 1863, *Verh. Zool.-bot. Ver Wien*, xiji, 1251-1288. Waterston, J., 1922, *Proc. Ent. Soc. Lond.*, p. v, fig. 1. Blair, K. G., 1944, *Ent. Mon. Mag.*, 80: 7.

Mr T. R. EAGLES exhibited about 50 living parasites, *Trichogramma evanescens*, Ww., which had emerged from an ovum of *Lothoe populi*, L., collected at Enfield, Middlesex.

The BARON DE WORMS exhibited a larva of *Apatele aceris*, L., from Kensington and larvae of *Ostera pigra*, Hufn., from Brookwood, Hants.

Canon T. G. EDWARDS exhibited the micro-lepidoptera, *Tinaea arcuatella*, Staint., and *T. cloacella*, Haw., bred from a fungus on alder at Aviemore, Perthshire.

Mr V. E. AUGUST exhibited a melanic form of *Argynnis paphia*, L., taken on 15th July 1945, in N.W. Sussex.

Mr L. G. PAYNE exhibited an imago of *Herse convolvuli*, L., taken on 31st August 1945, at Hammersmith.

Mr J. L. HENDERSON exhibited the beetles, *Ceuthorrhynchidius barnevillei*, Gren., and *C. rufulus*, Dufour, taken on *Achillea millefolium*, L., in his garden at Purley, Surrey.

Mr F. D. COOTE, on behalf of Mr A. E. CURTIS, exhibited *Nymphalis antiopa*, L., recently taken at Billingshurst, Sussex.

Mr A. BLISS exhibited pupae of *Macroglossum stellatarum*, L., from Purley, Surrey.

Mr H. R. LAST exhibited a dead specimen of the Colorado beetle, *Doryphora decemlineata*, Say, from Holland, and the Asparagus beetle, *Crioceris asparagi*, L., from Esher, Surrey, and Southend, Essex.

Commander G. W. HARPER, R.N., read a paper on "A War-time Visit to West Africa" (see *Trans.*).

26th SEPTEMBER 1945.

The PRESIDENT in the Chair.

Colonel G. F. Johnson, D.S.O., and Messrs O. G. Watkins; E. D. Bostock, F.R.E.S.; L. Christie; F. W. Chapman; B. J. Southgate, F.R.E.S., and R. E. Ellison were declared elected members.

Mr S. N. A. JACOBS exhibited: (a) *Attagenus gloriosae*, F., a species recently added to the British list from Limehouse. (b) A crimson-tinted form of *Pyrallis farinalis*, L., from Millwall Dock. (c) The carabid beetle, *Plochinus pallens*, F., from Copra in West India Dock from Ceylon. (d) Psychodid Flies. Probably carriers of Sand-fly or 3-day fever, ex Palm Kernels from West Africa.

Mr L. T. FORD exhibited a spray of white fruits of Elderberry (*Sambucus nigra*, L.) from Bexley, Kent.

Mr T. R. EAGLES exhibited larvae of *Perizoma bifasciata*, Haw., from Ashted, Surrey, and an entirely red form of the larva of *Electrophaës corylata*, Thunbg., from Bookham, Surrey.

Capt. N. D. RILEY read a paper on "The Entomological Collections of the British Museum," showing a series of lantern slides to illustrate his subject.

10th OCTOBER 1945.

The PRESIDENT in the Chair.

The death of Mr F. D. Coote, F.R.E.S., was announced. The following new members were declared elected:—Fl. Lt. M. W. P. Smith and Mr J. B. Purefoy.

Mr S. N. A. JACOBS exhibited the Carabid beetle, *Anchista binotata*, introduced with copra from Ceylon.

BARON DE WORMS exhibited larvae and pupae of *Cosymbia orbicularia*, Hb., from the New Forest, Hants.; larvae of *C. annulata*, Schulze, from Hampshire, and larvae of *Drepana cultraria*, F., from Hampshire.

Mr T. R. EAGLES exhibited larvae of a species of *Anaitis* (*plagiata*, L., or *efformata*, Guen.) from Box Hill, Surrey.

Mr N. T. EASTON exhibited varieties of the following butterflies: *Pieris napi*, L., *Argynnis selene*, Schiff., *Thecla betulae*, L., and *Lycaena phlaeas*, L. One of the varieties of *P. napi*, L., was an intersex. He also exhibited a somatic mosaic of the moth, *Abraxas sylvata*, Scop., from Abbot's Wood, Plumstead, Kent, and nests containing hibernating larvae of *Euproctis chrysorrhoea*, Hb., from Essex.

Mr V. E. AUGUST exhibited second brood imagines of *Argynnis selene*, Schiff., taken on 10th August 1945, in Sussex.

Mr J. L. HENDERSON exhibited nine species of Longicorns seen at Ashtead Common on 12th May 1945:—*Grammoptera variegata*, Germ., *G. ruficornis*, F., *G. holomelina*, Pool, *Rhagium mordax*, Deg., *Clytus arietis*, L., *Anaglyptus mysticus*, L., *Leiopus nebulosus*, L., *Phymatodes alni*, L., and *Tetrops praeusta*, L.

Mr E. J. BUNNETT, M.A., read a paper on "The Eggs of *Pentatoma rufipes*, L." (see *Trans.*). The paper, which was illustrated by lantern slides, had particular reference to the egg-breaker.

27th OCTOBER 1945.

THE ANNUAL EXHIBITION—RECORD OF EXHIBITS.

The PRESIDENT opened the exhibition at 2.30 p.m. in the Library of the Royal Society at Burlington House, Piccadilly, with the following address:—

Ladies and Gentlemen—It gives me great pleasure to welcome you here this afternoon, on behalf of the Council of the South London Society. It is very satisfactory that this, the first exhibition to be held after the conclusion of hostilities, should be rendered so interesting by the large numbers of rare migrants which, I understand, will be on view, and I take this opportunity of thanking all those who have brought exhibits for the trouble they have taken to make the exhibition a success.

The Society is greatly indebted to the President and officers of the Royal Society for their kindness in giving us accommodation in this fine building, and for allowing us the use of their rooms for the exhibition to-day. It is a source of distress that it has not yet proved possible to obtain accessible accommodation for our library and collections, but we are promised that this is a state of affairs which will be remedied in the near future.

I am sure that you will be glad to hear that, in spite of the long duration of the war, this old Society has continued to flourish, and, at our last meeting, I was able to announce that, for the first time in our history, membership had exceeded the 300 mark.

It is very important for the work of the Society that membership should continue to expand, and the Council are most anxious to do all in their power to attract new members. You will have seen from the last issue of our *Proceedings* that a start has been made in the publication of illustrated papers dealing with particular families of the Microlepidoptera. It is the intention to deal with successive families as the material can be collected, with the eventual object of being able to bring out an authoritative and well-illustrated work on these interesting families. The production of illustrated articles of this nature, however, imposes a heavy strain on the Society's funds, and this can only be lessened by an increasing membership with the natural corollary of an expanding revenue from subscriptions.

I must not detain you much longer from an examination of the exhibits, but I would ask you to bear with me for one minute more, since I have an important announcement to make.

Having in view the conclusion of hostilities and the return to more normal collecting conditions, your Council propose to hold a Reunion Supper at the Connaught Rooms in January next, with the particular object of extending a welcome to our returned prisoners-of-war; the three who are known to have been held in the Far East, I am glad to be able to announce, are all safe. The proposal is that this reunion shall be held on the eve of the Annual Meeting of our Society, that is, Tuesday, 22nd January 1946.

It is the intention that members and their guests, of either sex, shall be eligible to attend, and whilst the arrangements have not been finally concluded, the cost of the supper will not exceed 12s 6d, including tips, but, naturally, not including wine. The returned prisoners-of-war will be invited as guests of the Society. Should numbers permit, it may prove possible to extend invitations to entomologists who are not at present members of the Society, but this must depend upon the response from our own members and the number who can be accommodated at the Connaught Rooms.

A special Committee has been appointed to consider the arrangements, and information is required as soon as possible concerning the probable numbers likely to attend. A circular will be issued to all members very shortly, but in order to save time, and as a considerable proportion of our members are here to-day, all those who are likely to attend are requested to inform the Honorary Secretary of their intention before they leave this afternoon. Non-members who would like to attend are also invited to give in their names and addresses. Such information will be of the greatest help to the Committee. I sincerely hope that this has not been sprung upon you at too short notice, and that this proposal of your Council will commend itself to you.

Ladies and Gentlemen, I must apologise for keeping you so long, and now beg to declare the exhibition open.

The following exhibits were shown:

Mr B. W. ADKIN—Some forms and aberrations of the Lepidoptera, *Poecilocampa populi*, L., *Eriogaster lanestris*, L., *Mulacosoma neustria*, L., and *M. castrensis*, L., including gynandromorphs of *populi*, *lanestris*, and *castrensis*.

Mr A. A. ALLEN—Coleoptera, Elateridae and Curculionidae: (1) One of the only two known British specimens of the aberration *occitanicus*, Vill. (having the thorax black) of the rare Elaterid, *Ludius ferrugineus*, L. (the type form has the thorax red). Bred in June 1945 from a larva taken in Windsor Forest during the spring. The other specimen was bred at about the same time, and from the same locality, by Mr H. Donisthorpe. (2) *Cionus woodi*, Donis. One of a series taken at Farnham, Surrey, some years ago by Mr R. S. Perry. Apart from this the species is not known to have been found since it was described, in 1921, on a pair taken at Lake Windermere by Rev. T. Wood. (3) *Dorytomus filirostris*, Gyll., a weevil new to the British list, taken during the past August at Wicken Fen by Mr R. Kaufmann. Easily distinguished from our other species by the length and slenderness of the antennae and rostrum.

Mr VICTOR E. AUGUST—*Nymphalis polychloros* (L.) from Suffolk; a melanic aberration of *Argynnis paphia* (L.) from N.W. Sussex; an aberration of *Panaxia dominula* (L.); examples of the summer brood of *Argynnis selene* (Schiff.) from N.W. Sussex, taken 10th October 1945; *Colias hyale* (L.) from Amberley, Sussex; a series of the summer brood of *Leptidea sinapis* (L.) from N.W. Sussex; a dwarf form of *Colias croceus* (Geoff.) from the South Downs; and a partly bleached specimen of *Maniola jurtina* (L.).

Mr T. L. BARNETT—A long series of *Plebejus argus*, L., the heather form, from Oxshott, Surrey; Ashdown Forest, Sussex; South Devon; Kemsing, Kent; and Eynsford, Kent. A series of *Aricia agestis* (Schiff.) including two ab. *obsoleta*, Tutt, and a striated form from Surrey. A series of *Coenonympha pamphilus* (L.), cream and white spotted forms, from Kent, Surrey, and Devon. A series of *Coenonympha tullia* (Müll.) from Witherslack, Wixhall Moss, Rannoch, and Thorn Moor near Doncaster.

Mr E. S. A. BAYNES—Lepidoptera—(1) Insects bred in 1945: *Bupalus piniaria* (L.), West Surrey; two males and two females, ab. *funebria*, Cckne.; one ab. *fuscantaria*, Krulik, female; *Panaxia dominula* (L.)—specimens with bronze forewings and yellow spots, with blue forewings and with smoky patch on hindwings; a short series of ab. *bimacula*, Cckne.; *Hemaris tityus* (L.) showing fugitive scales, from larvae found on perennial garden Scabious, *Scabiosa caucasica*, Bieb. (2) A selection of European (including British) *Zygaenidae*. (3) Two *Aegeria andreniformis* (Lasp.) in the same section of a stem of *Viburnum lantana*, L.

Mr S. BEAUFOY and Dr E. B. FORD—Lepidoptera: *Plebejus argus* L.—Two specimens taken at Bentley Wood near Ipswich, 14.vii.45. There are only ancient records of the species from this district, and it was

never reported from Bentley Wood. The nearest localities for it at the present time are some 30 miles away.

Mr E. J. BEDFORD—Drawings of the following Orchids: *Malaxis paludosa*, Sw., *Liparis Loeselii*, Rich., *Neottia Nidus-avis*, Rich., *Spiranthes gemmipara*, Lindl., *Listera cordata*, Br., *Goodyera repens*, Br., *Orchis ustulata*, L., *Orchis Simia*, Lam., *Ophrys fuciflora* Reichb., *Gynadenia albida*, Rich.; hybrid *G. albida*, Rich. \times *G. conopsea*, L.; hybrid *Orchis maculata*, L. \times *Platanthera bifolia*, Br.; hybrids of *Ophrys apifera*, Huds. \times *Ophrys fuciflora*, Reichb.; *Herminium Monorchis*, Br., *Neotinea intacta*, Reichb.

Dr K. G. BLAIR—A short series of *Sedina büttneri*, Hering, a Wainscot moth new to the British list, from Freshwater, I.O.W.

Mr A. A. W. BUCKSTONE—Lepidoptera: Two male *Pontia daplidice* (L.) taken near Leatherhead, 27th August 1945; *Coenonympha pamphilus* (L.) male, upperside smoky and having a row of black spots on upperside of hindwings, taken at Ashted, 10th May 1945; *Pyrgus malvae* (L.), upperside slightly striated, Ashted, 10th May 1945; *Polyommatus icarus* (Rott.), the tint of blue on upperside approaching that of *Lysandra bellargus* (Rott.), taken at Leatherhead, 27th August 1945; *Lysandra coridon* (Poda), male, *semiobsolata*, Tutt, the spots asymmetrical, taken at Dorking, 23rd July 1945; *Aglais urticae* (L.), a series exemplifying extremes in dark and light forms, Surrey and N. Devon, 1945; *Zygaena filipendulae* (L.), yellow male, Clandon, Surrey, 5th July 1920; *Zygaena trifolii* (Esp.), a black male, Sussex, May 1921; *Ematurga atomaria* (L.), a series of melanic specimens, Burnley, 23rd May 1919, also a series of extreme forms from various localities; living pupae and imagines of *Aglais urticae* (L.), Ewell, Surrey; living larvae of *Colias hyale* (L.), ova, Leatherhead, Surrey; living pupae of *Pieris napi* (L.), ova, Ashted, Surrey, and *Bupalus piniaria* (L.), larvae, Oxshott, Surrey.

Dr G. V. BULL—Varieties of *Aglais urticae*, including var. *ichneusa*, Bon., var. *polaris*, Stdgr., and examples showing elongation of the blue lunules, absence of discal spots, and abnormalities in size and colour. A series of *Aglais urticae* (L.) showing the results of a temperature experiment by another collector. *Argynnis cydippe* (L.) with cuneiform submarginal spots on the hindwings. *Maniola jurtina* (L.) with nearly uniform pale underside hindwings. Examples of parasitic Ichneumonidae bred from pupae of *Lasiocampa trifolii* (Schiff.).

Mr BRUCE BURNS—Lepidoptera taken or reared, 1945: 2 female *Gastropacha quercifolia* (L.), bred June; 1 male *Sphinx ligustri* (L.), taken at rest on garden fence at Gosport, June; 2 male *Laotoë populi* (L.), bred April; male and female *Philudoria potatoria* (L.), bred July; 3 male *Mimas tiliae* (L.), caught and bred May; 2 *Deilephila elpenor* (L.), bred June; male and female *Cerura vinula* (L.), bred April; 1 female *Zeuzera pyrina* (L.), taken newly emerged on a Sycamore tree, 15th July, in Gosport; male and female *Panaxia dominula* (L.), taken whilst paired up near River Itchen at Eastleigh, 2nd July; 2 *Vanessa atalanta*

(L.), with variation on hindwings, caught in garden at Gosport on Michaelmas Daisies, September and October; 1 *Argynnis paphia* (L.), ab. *valezina*, Esp., New Forest, July; 1 male *Maniola jurtina* (L.), with bleached wings taken near Yarmouth, Isle of Wight, July; living exhibit of *Macrothylacia rubi*, a "Fox Moth" larva found on a blackberry bush in September at Bundoran, Co. Donegal.

Mr L. C. BUSHBY—Living specimens of: 3 Giant Millipedes (*Spirostreptus* species, Ord. Diplopoda)—Abundant in damp forest country in West Africa; feed on decaying vegetation; when alarmed exude an acrid, yellow fluid probably distasteful to birds and mammals, otherwise harmless; attain a length of nine inches. Imperial Scorpion (*Pandinus imperator* Koch, Ord. Scorpionidea)—Inhabits forest country throughout the greater part of West Africa; nocturnal, resting by day under logs, in hollow trees, etc.; the young are born fully developed and for some weeks are carried about on their mother's back. 2 Giant Land Snails (*Achatina variegata* Roissy, Ord. Pulmonata)—In common with some other members of the genus, this large land mollusk is common in tropical regions of Africa; the specimens exhibited inhabit the Gold Coast; the eggs, similar to those of *Achatina immaculata*, Lamarck, exhibited in spirit, are deposited in batches in pockets excavated in the soil. (Photographs of this latter species with eggs and young brood were shown). Set specimen of a Hawk Moth (*Euchloron meguera*, L., Ord. Lepidoptera)—This handsome species ranges widely throughout Central and South Africa.

Mr S. A. CHARTRES—*Pontia daplidice* (L.), taken at rest at 8 p.m. (D.S.T.), on 12th July 1945, at Beachy Head, Sussex, and one taken at the same place in similar circumstances on 21st July. Varieties of *Lysandra coridon* (Poda) and of *L. bellargus* (Rott.) taken in 1945. Colour forms of *Argynnis euphrosyne* (L.) and *Aglais urticae* (L.).

Dr E. A. COCKAYNE—*Anaitis efformata*, Guen., including two examples of ab. *tangens*, W. Frit., and one without a transverse band.

Mr J. C. B. CRASKE and Mr R. M. CRASKE—*Lysandra coridon* (Poda): Gynandromorph, left side male, right side female; a gynandromorph having the right forewing costal area heavily scaled with male colouring; a series of male colour forms including abs. *pulla*, B. & L., *livida*, Gillm., *subsuffusa*, Tutt, *suffusa*, Tutt, *lavendula*, B. & L., *atrescens suffusa*, *ultra-viridescens*, B. & L.; a series of male undersides including extreme forms of abs. *alba*, Tutt, *albescens*, Tutt, *albaradio*, *striata*, and *digitata*, Courv., forms; a series of females including abs. *transformis*, B. & L., *fowleri*, South, *syngrapha*, Kef., and other forms; a series of female undersides including abs. *pulla*, B. & L., *digitata*, Courv., *obsoleta*, Tutt, *glomerata*, Tutt, *alba*, Tutt, and *albescens*, Tutt. *Lysandra bellargus* (Rott.): Extreme form male *radiata*, Tutt; male upperside left forewing *transformis*, B. & L.; a series of abs. including *obsoleta*, Tutt, and *digitata* forms; hybrid *L. coridon* × *L. bellargus*, var. *polonus*, Zell. *Celastrina argiolus*, L.: Extreme form female *ultra-radiata*; gynandromorph, left side female,

right side male—both taken in 1944. *Polyommatus icarus*, Rott.: Gynandromorph, left side female, right side male; also a series of abs. including *transformis* and *obsoeta* forms. *Plebejus argus*, L.: A gynandromorph having left side predominantly male colouring; a series of abs. including *transformis* and confluent forms. *Argynnis selene*, Schiff.: A long series of aberrations taken in 1945 including an extreme form of female almost entirely black; a series of extreme forms showing confluent markings on forewings and melanic hindwings; a series of *obsoleta* forms; a series of suffused and banded forms; a series of undersides extensively rayed with silver; example of colour variation including two with cream ground. *Argynnis euphrosyne* (L.): A male of cream ground colour; a series of males and females of the suffused and banded forms. *Argynnis aglaia* (L.): Two examples of male and female showing tendency to melanism; one male underside ab. *pallidula*. *Argynnis cydippe* (L.): Examples of colour variation including two extreme forms. *Maniola jurtina* (L.): A male of the pale buff ground colour; a series showing various forms of ab. *transformis*. *Aphantopus hyperantus* (L.): A series including *lanceolata*, Shipp., and *obsoleta* forms. *Eumenis semele* (L.): Four examples of the female showing extra spots on forewings. *Polygonia c-album* (L.): An asymmetrical example of the female; a female with dark suffusion on the hindwings and a male showing white patches on the forewings. *Lycaena phlaeas* (L.): A long series showing range of variation of abs. *transformis*, *obliterata*, Tutt, *suffusa*, Tutt, *radiata*, Tutt (hindwings), *extensa* (forewings), *intermedia*, Tutt, and underside forms. Taken during 1943/4/5 in the same locality.

Capt. W. CROCKER—*Arctia caja* (L.): Examples of yellow and other forms bred by the late R. Swift, Esq., at Bexley Heath, Kent., during 1933-34.

Mr P. N. CROW—*Arctia caja* (L.) aberrations; *Amathes alpicola*, Zett., from Inverness-shire pupa; *Ptilophora plumigera*, Esp., bred from ova collected in Buckinghamshire; *Colias croceus*, Fourc., var. *helice*, Hb.; dwarf *Euchloë cardamines* (L.); *Aricia agestis* (Schiff.), ab. *radiata*, Obth.; a variety of *Plebeius argus*, L.; a variety of *Nymphalis io* (L.); *Herse convolvuli* (L.); *Celerio livornica*, Esp.; larvae of *Lophopteryx cucullina*, Hb.

Mr A. E. CURTIS—*Nymphalis io* (L.), ab. *semi-ocellata*., Frhk., caught in W. Sussex, 19th July 1945; *Nymphalis antiopa* (L.), taken at rest by Miss Alice Whiley, Plaistow, W. Sussex, 11th September 1945; *Colias hyale* (L.), taken near Amberley, Sussex, August 1945.

Mr A. F. DOYLE (per Mr G. DE C. FRASER)—A beetle found in burrow in the centre of a 12 in. × 12 in. log of Columbian Pine at Fleetwood, Lancs., in 1945. The log had been in stock there for several years.

Mr NIGEL T. EASTON—Captured and bred in 1945: *Pontia daplidice* (L.)—Part of a series caught at Millhook, N. Cornwall, in the four days, 20th to 23rd July 1945, during their northward flight. Many more were

seen, along with one male *Argynnis lathonia* (L.). *Melanargia galathea* (L.)—A female showing more than normally ochreous hindwings, North Cornwall, 24.7.45. *Eumenis semele* (L.)—2 male uppersides, typical of the N. Cornish race, one of them exceptionally dark, and a male underside showing complete absence of the lower ocellated submedian spot, 20th-23rd July 1945. *Argynnis selene* (Schiff.)—A second brood var. showing outstanding straw-coloured marginal lunules to all wings; taken near Bude, 24.7.45. *Nymphalis polychloros* (L.)—Two specimens taken July 1945, near Poundstock, N. Cornwall. *Aglais urticae* (L.)—Two of the Aberdeen forms, bred June 1945, showing rich colouring, large and bright blue border lunules and some confluence of central, costal, and marginal blotches as in ab. *polaris*, Stdgr. *Maniola tithonus* (L.)—A male albino, Penhalt, N. Cornwall, 23.7.45. *Thecla betulae* (L.)—An unusual var. of the female showing symmetrical orange blotches on the hindwings, bred from a W. Sussex larva, July 1945. *Arctia caja* (L.)—A male bred from an Aberdeen larva, June 1945, with beautiful pink-orange hindwings and yellow-ringed hindwing spots; forewings typical. *Hemerophila abruptaria* (Thunb.)—A series including a pair of ab. *fuscata*, Tutt, from Hampstead. *Euchloris smaragdaria* (F.)—A series bred in 1945, Essex Coast. Asymmetrical Lepidoptera taken or bred in 1945: (1) *Lycaena phlaeas* (L.)—A female with perfectly formed but markedly small left hindwing, W. Sussex, 30.7.45. (2) *Melanargia galathea* (L.)—A male with all markings from the central area to the margin of the left hindwing broken up and smudgy, remaining wings unaffected. (3) *Pontia daplidice* (L.)—A male with left forewing apical marking and discal spot of a pale yellow-brown colour, N. Cornwall, 21.7.45. (4) *Vanessa atalanta* (L.)—A female of the white-spotted form having the red markings on fore and hindwings of right side of a pink-orange colour, those on left side being typical, bred from larva near Wendover, Bucks, 17.9.45. (5) *Abraxas sylvata* (Scop.)—An example, thought to be unique, caught in Abbey Wood, Kent, 14.6.45, with costal, inner marginal, discal and inner angle spots and blotches confluent with the basal blotch on right forewing only; other wings typical; this is probably a somatic mosaic. (6) *Panaxia dominula* (L.)—A male bred 22.6.45 from a Plymouth larva showing complete absence of both forewing basal spots and orange mid-forewing spot with reduction of sub-apical blotch on right forewing only; all other wings typical. (7) *Pieris napi* (L.)—A number of forms, including ab. *bimaculata*, Schima, ab. *impunctata*, Rüb, ab. *macromaculata* (Müll.), the last bred from inbred heterozygous ab. *hibernica*, Schmidt, parents, showing a decided streak of bright yellow scaling in the central area of the upperside of the left hindwing. This may be an example of homoeosis but is more probably an intersex; bred, June 1945. A fine 3-spotted male underside, ab. *aversomaculata* (Stach), 3rd brood example, from a larva found in Hampstead, N.W.3; the 2nd and 3rd spots are large and intensely black. Ab. *citrona* (Frhk.)—A pair and a ♂ underside of the brood; bred, Donegal, 1945. Two female examples of ab. *citrona*

(Frhk.), ab. *continua* (Bryk.), one of the spring and one of the summer brood; bred, 1945. A fine example of Mod. ♀ *regressa-aestiva* (Müll.); bred, Aberdeen, 25.6.45. An unusual female, possibly unique, showing a combination of sub-normal lower forewing spot with confluence of upper forewing spot with both margin and apical blotch; this form is un-named and was bred 20.6.45 from a Scottish-Irish cross. Four examples of a deep ochreous form, bred from an all-white, wild Aberdeen ab. *magnomaculata* (Müll.) female, caught August 1944. The top example was the only one of what is believed to be a new form with deep buff wings with white borders to emerge from a brood of 47, the remainder being whites. It formed a partial third brood in October 1944 and was inbred. Out of the resulting F_1 brood of 23, which emerged irregularly all through 1945, one only of this new form emerged, and although it did so on 3rd August 1945 it was of the spring form. This is the second example shown. It was outcrossed and a total of 84 pupae were obtained, out of which 18 imagines emerged during September 1945. Of these 8 were females, 5 of them deep cream all over, with no white margins, the remaining 3 being of the normal well-marked white Scottish form. This all-over buff form is already well known in some examples from Scotland and Ireland. The 4 examples in direct line of descent are exhibited to show how the gene, or genes, producing the buff colouration, resulted in the white bordered buff form of female as long as they were inbred, but as soon as the female was outcrossed this gene or genes, acting in the rather different gene-complex of a male from another part of the British Isles—and not in any way related—resulted in the more familiar all buff phenotype, as shown by the third and fourth examples shown. Both these females were paired last month with brother males, and it will be interesting to note results and the proportion of buff to white forms produced in the F_4 generation. At the moment this form is a genetic puzzle as it turned up once per brood for two successive inbred generations, the first one shown not conforming to the colour of the original white wild parent. Two females, gen. vern. *septentrionalis* (Vty.), mod. *nigrovenosa* (Selys), ab. *bicolor* (Müll.), bred Aberdeen, April 1945. A universally grey-marked female, bred 14.4.45, from an Aberdeen × Donegal pairing. A female ab. *confluens* (Schima), ab. *bicolor* (Müll.), bred 20.6.45, from Aberdeen × Donegal pairing. Three females, ab. *continua* (Bryk.), ab. *posteromaculata* (Rev.), bred June-July 1945, from Aberdeen × Donegal pairing. Female ab. *posteromaculata* (Rev.), bred 23.6.45, Aberdeen, and female ab. *subimpunctata* (Müll.), bred June 1945, from Aberdeen × Donegal pairing, showing spotless underside.

Canon T. G. EDWARDS—Lepidoptera taken in 1945: Bred specimens—*Hemaris fuciformis* (L.), Ashtead, Surrey; *Trichiura crataegi* (L.), Hants.; *Sarrothripus revayana* (Scop.), Ashtead, Surrey; *Oidaemato-phorus carphodactylus* (Hb.), Box Hill, Surrey; *Peronea boscana* (F.), Box Hill, Surrey; *Eilema caniola* (Hb.), Polperro, S. Cornwall. Captured specimens—*Apatele leporina* (L.), taken on a wall in the

Borough of Lambeth; *Panaxia dominula* (L.) and *Euphyia picata* (Hb.), from Looe, S. Cornwall; *Gripesia aprilina* (L.), Hants.; banded form of *Lymantria monacha* (L.), Ashted, Surrey; *Thera obeliscata* (Hb.) and *T. variata* (Schiff.), New Forest; *Erannis leucophaearia* (Schiff.), var. *merularia*, Weym., Ashted, Surrey; *Graptolitha ornitopus* (Hufn.), Sussex; *Stenoptilia pneumonanthes*, Buett., S. Cornwall.

Mr J. FINCHAM-TURNER—Pupae of *Papilio machaon*, L., from larvae found feeding on carrot and parsnip in a garden near Ringwood, Hants, during September 1945. *Panaxia dominula* (L.), a series bred from a pairing of ab. *bimacula*, Cckne., parents, showing large variation in the spots of the forewing, especially in the two basal spots.

Dr E. B. FORD—Lepidoptera: (a) *Panaxia dominula*, L. Three specimens from the Dry Sandford colony. (1) Showing the method of marking, by which the numbers of this colony have been estimated on the system devised by Dowdeswell, Fisher, and Ford (*Annals of Eugenics*, 10; 1940). (2 and 3) The effects of + and - selection for the expression of a heterozygous gene, showing the characteristics of var. *medionigra*, Cckne., respectively intensified and reduced. (b) *Melitaea athalia*, Rott. A specimen of var. *navarina*, captured by Dr Ford at the Blean Woods, Kent, 23.vi.45.

Mr L. T. FORD—Psychidae, including specimens of *Pachythelia villosella* (Ochs.), *P. opacella* (H.-S.), *Sterrhopteryx hirsutella* (Hb.), *Whittleia reticella* (New.), *Epichnopteryx pulla* (Esp.), *Fumea casta*, Pallas, *Proutia betulina*, Zell., *Narycia monilifera*, Geoffroy (*melanella*, Haw.), *N. marginepunctella*, Steph. (*herminiata*, Tutt), *Solenobia inconspicuellula*, Staint., *S. lichenella*, L., *Taleporia staintoni* (Walm.), *T. tubulosa* (Retz.), *Bacotia sepium* (Speyer), with larval cases, pupa skins, and preserved larvae.

Mr G. DE C. FRASER—From near Mold, N. Wales: A series of *Ortholitha scotica*, Cckne. The identity has been assumed owing to the time of emergence which preceded that of the second series, *Ortholitha mucronata* (Scop.), by rather less than four weeks. The habits of the two species appear to differ somewhat, the former being of the quicker flight and preferring ground near or between trees and bushes to the barer mountain side. From Aviemore: A single specimen of *Polyommatus icarus* (Rott.), a female having large discal spot, whitish, on the forewings. From Methop Moss, Witherslack, Lancashire: A series of *Coenonympha tullia* (Müll.), showing considerable variation. From Formby, near Liverpool: Gynandrous specimen of *Orgyia antiqua* (L.), bred by A. R. Davidson of Formby and shown on his behalf. This was a halved gynandromorph, the right side being completely female and the left side completely male.

Mr F. T. GRANT—Coleoptera from Cobham Park, Kent: *Antherophagus pallens* (F.), two males and eleven females, taken on blackberry flowers; *A. canescens*, Grou., taken on thistle flowers; *Orchesia minor*, Wk., beaten from dead ash boughs; *Platycis minuta* (F.), an apparent

case of assembling, twelve males and one female being taken in one spot.

Cdr. G. W. HARPER, R.N.—*Apatura iris* (L.), bred 7.6.45 from W. Sussex larva. *Nymphalis polychloros* (L.), taken 14.7.45 on *Buddleia globosa*, Lam., by M. W. Harper (aged 9) at Rustington, Sussex. *Colias hyale* (L.), representative of 14 specimens taken on South Coast between Shoreham and Portsmouth, July to 14th October 1945. *Endronis versicolora* (L.), pair taken in cop on birch trunk at Aviemore, 21.4.45; offspring now in pupa (shown). *Cupido minimus* (Fuessl.), second brood, 13.7.45, Shoreham, Sussex. *Erynnis tages* (L.), second brood, 28.7.45, Shoreham, Sussex. *Celastrina argiolus* (L.), dwarf second brood female, 19.7.45, Angmering, Sussex. *Lysandra coridon* (Pod.), (1) Female ab. *caeruleocephala-radiosa*, Shoreham, 29.7.45; (2) female ab. *caeca*, Courv., Shoreham, 4.8.45, partial gynandromorph, left hindwing and upperside male. *Cleora cinctaria* (Schiff.), series representative of Scottish race, Struan, 23.4.45. *Nothopteryx carpinata* (Borkh.), representative of Scottish race, Aviemore, 21.4.45. *Isturgia carbonaria* (Clerck), representative of series taken at Aviemore, 21.4.45. *Anarta cordigera* (Thunb.), Aviemore, 26.4.45. *Procris globulariae* (Hb.), representative of series taken in Sussex, 26.6.45. *Sphecia bembeciformis* (Hb.), representative of series taken off poplars at Rustington, Sussex, 17.6.45. *Mythimna turca* (L.), representative of series taken at sugar at Havant, Hants, 3.7.45. *Catocala promissa* (Schiff.), Havant, 26.7.45. *Oria musciosa* (Hb.), Warminster, Wilts, 26.7.45. *Heliothis peltigera* (Schiff.), Angmering clover fields, August. *Abraxas grossulariata* (L.), a dark dwarf at Angmering, 14.8.45. *Herse convolvuli* (L.), a large dark female; three taken around Littlehampton, Sussex, in September. *Nonagria sparganii* (Esp.), bred from pupae at Shoreham and Angmering, 4.8.45; a specimen of a parasite (Hymenopterous) which had attacked 90% of the larvae; and a pupa skin in a stem of *Typha latifolia*, L. *Nonagria typhae* (Thunb.), bred from pupae at Shoreham and Angmering, 30.8.45.

Mr C. N. HAWKINS—Three preserved larvae (dark form) of *Herse convolvuli*, L., bred *ab ovis*. The parent moth was taken at rest in his garden at Freshwater, Isle of Wight, by Dr K. G. Blair, on 23rd August 1945, who obtained eggs from her on 26th August and later. Of 13 ova given to Mr Hawkins, all hatched 4-7.ix.45, two larvae died just after their second moult, having apparently been attacked by mites introduced accidentally with the food; five larvae were preserved and six have gone down for pupation. Four larval moults were undergone, the five stages taking, for the oldest larva, approximately 7½, 5, 6, 12, and 13 days respectively. There was considerable variation in colour and markings and some larvae remained green up to the fourth moult, but all were dark in the last (fifth) larval stadium.

Lt.-Col. W. B. HAWLEY, D.S.O.—(1) Six specimens of *Celerio livornica*, Esp., captured in Wiltshire in 1938 and 1943, and twenty-one specimens of the same species, bred from ova obtained from 1943 captures.

(2) A specimen of genus *Procris*, taken on 29th May 1945, in company with *P. geryon*, Hb., and *P. globulariae*, Hb., but seeming to differ from these species. (Examples of *P. geryon* and *P. globulariae* were shown for comparison: all three specimens from the same locality.)

Mr H. HAYNES—*Parasemia plantaginis* (L.), bred series showing variations of wing markings including two melanic, others with dark hindwings, Salisbury district, 1944. *Panaxia dominula* (L.), extreme forms, one with absence of *bimacula* markings, others with small pin point dots from Oxford strain, one from Salisbury with central spot in inside band extended into a line on both upper wings, also one with copper hindwings, bred 1944-45. *Argynnis euphrosyne* (L.) female, all wings dark; also a rayed underside, Bentley Wood, 1944-45. *Melitaea cinxia* (Rott.). A rayed underside, Whiteparish, 1945. *Lysandra bel-largus* (Rott.). A series including one with heavy striations on upper wings taken at Salisbury, also one "*radiata*" and two "*semi-alba-obsolete*," from Dr Whitehouse collection. *Lysandra coridon* (Poda). An extraordinary example, taken by exhibitor, 6th August 1944, "*ultra-radiata*," B. & L., with striations on all wings, chalk underwings with well developed border markings. *Pieris napi* (L.), bred series including four albino, two fine dark forms, much radiated, also a number well banded of both sexes. *Eumenis semele* (L.). A long series, caught 1944-45, Salisbury, male and female, showing wide variation both in colour and markings, obsolete hindwing markings and some one-spotted underside males.

Mr J. L. HENDERSON—Some of the larger species of Staphylinidae taken in his garden: *Ontholestes murinus*, L., *Staphylinus stercorarius*, Ol., *S. olens*, Müll., *S. ater*, Grav., *S. globulifer*, Fourc., and *S. compressus*, Marsh.; and two of the smaller—*Homoeusa acuminata*, Märk., *Aleuonota aurantiaca*, Fauv. (the last is only the fifth British specimen recorded in 76 years).

Mrs E. A. HESLOP—I. Lepidoptera: (a) Show-case containing British Butterflies taken by Mrs E. A. Heslop during 1945, including the following—*Pontia daplidice*, L., one ♀, Devon, 2nd October 1945; *Colias hyale*, L., two ♂♂, Somerset, 15th and 27th August 1945. (b) Pocket-box containing the following rare African Moth, a Bombycid species with tails of extreme length, taken by Mrs E. A. Heslop during 1944—*Eudaemonia brachyura*, Drury, one, Obetim, S. Nigeria, 1944. II. Mammals: Mounted heads of African Mammals shot by Mrs E. A. Heslop in Nigeria, as follows—(i) *Choiropotamus porcus* (Red River-hog). ♀. This species is found locally in the African forest belt. It is fierce and very aggressive but is seldom seen, and is very rare in collections. It is the most handsomely coloured of all the pigs. Shot near Obetim, S. Nigeria, on 26th June 1944. (ii) *Hippopotamus amphibius* (Common Hippopotamus). ♂. This is a full set of tusks and incisors from a man-killing Hippopotamus shot in the forest near Obetim, S. Nigeria, on 27th January 1945. This specimen, which was much less aquatic

than others of its kind, exhibited considerable modification of the skull. Weight about 3 tons.

Mr I. R. P. HESLOP—I. Lepidoptera: (a) Show-case containing rare British migrant butterflies taken by I. R. P. Heslop—(i) *Nymphalis antiopa* (L.). ♀, Gloucestershire (Forest of Dean), 12th September 1921. (ii) *Pontia daplidice* (L.). Summer brood, ♂, Cornwall, 30th July 1945; Autumn brood, two ♂♂, two ♀♀, Cornwall, 1st October 1945, and ♀, Somerset, 5th October 1945. (iii) *Argynnis lathonia* (L.). ♂, ♀, Somerset, 25th September 1945. (iv) *Lampides boeticus* (L.). ♂, Somerset, 21st September 1945. (b) Show-case containing varieties of African butterflies taken in Nigeria as follows—(i) *Teracolus evippe*, L., ♀ form *ocale* Boisd. A yellowish var. of this form, together with a typical example thereof; both specimens taken at Owerri, S. Nigeria, in June 1930. (ii) *Precis octavia* Cramer. Unique white var., together with series of typical specimens of this Vanessid taken at the same place and time (Obetim, S. Nigeria, 31st August 1941). One or two similar white vars. have been recorded in the case of other Vanessids (e.g. *Polygonia c-album*, L.), but this is the first time this excessively rare variation has been noticed in the present species. (iii) *Precis clelia* Cramer. Var. lacking the purple patches of the hindwings; and var. with pale (and somewhat reduced) left hindwing, together with three typical specimens of this Vanessid. The first var. and two of the typical specimens were taken at Owerri, S. Nigeria, in May-June 1930. The second var. and one of the typical specimens were taken at Obetim, S. Nigeria, in 1943 and 1941 respectively. II. Mammals and Birds: (a) Mounted heads of African Mammals shot by I. R. P. Heslop in Nigeria as follows—(i) *Gazella dama* (Addra Gazelle). ♂. A very good head of this rare species, which is found in a very limited area of the Sahara Desert from the vicinity of Lake Chad to Kordofan. It is the largest and most beautiful of all the Gazelles. This specimen was shot in northern Bornu on 16th April 1941. Owing to its wariness, fleetness, and remarkable protective coloration (the white parts of the body merging into the glare of the desert), and the inaccessibility of its haunts, this species is regarded as one of the great prizes of the sportsman. (ii) *Gazella rufifrons* (Red-fronted Gazelle). ♂. A good head of this species, which is one of the commoner Gazelles of the Sudan and sub-desert belts of Africa and occurs over the greater part of the Northern Provinces of Nigeria. This specimen was shot in Bornu on 11th April 1941. (b) Stuffed specimens of African Birds shot by I. R. P. Heslop in Nigeria, as follows—(i) *Anomalophrys superciliosus*, Reichenow (Brown-chested Wattled Plover). This species, occurring in the "orchard bush" north of the African forest belt, is one of the rarest birds in the world. This specimen was shot near Okigwi, S. Nigeria, on 18th December 1933. (ii) *Guttera edouardi (pallasi)*, Sclater (West African Crested Guinea-fowl). This is one of the rarer Guinea-fowl, occurring very locally in the forest belt of West Africa. In Nigeria it was first reported in 1936 by I. R. P. Heslop. This specimen was shot near Obetim, S. Nigeria, on

21st July 1943. III. Documents: Original Letters as follows—(i) A letter dated 13th December 1856, from William Spence, illustrating the early history of the Entomological Club. (ii) A letter dated 27th May 1861, from Edward Newman, constituting evidence for the occurrence in Britain of *Lythria purpuraria* (Linn.).

Mr P. E. N. HITCHINS—Variations of *Aglais urticae* (L.) produced by exposing pupae to abnormal temperatures and abnormal concentrations of carbon dioxide. The specimens showed (a) strong development of lunules, (b) a series in which the groundwork approaches white, (c) a heavily black veined series with black tips to the forewings, (d) a series in which all the black markings have increased in size.

Mr A. P. HOWARD—Lepidoptera: *Macroglossum stellatarum* (L.), five specimens, three bred from larvae taken at New Barnet, Herts, from 6th-9th August 1945; one bred from larva taken at Ashted, 5th August 1945, by J. G. Dunbar, and one imago taken at Evesham on 18.8.45; also one specimen of *Dicycla oo* (L.), bred from a pupa dug at a locality in North London, 9.6.45. Exhibited for J. Dunbar (Visitor).

Mr J. O. T. HOWARD—Miscellaneous butterflies and moths collected in Ceylon, January-August 1945.

Captain R. A. JACKSON, R.N.—Lepidoptera: Rhopalocera—*Aglais urticae* (L.), a rayed example from Folkestone. *Thecla betulae* (L.), a female with orange markings on the hindwings above the "tail." *Melitaea athalia* (Rott.), examples from East Kent. *Colias hyale* (L.), from Kent, Hampshire, and Wiltshire, and a longer series of *Euphydryas aurinia* (Rott.) from a new and strong colony recently discovered near Bishops Waltham in Hampshire. This colony was definitely not in existence in 1943 or in previous years. Heterocera—*Bombycia viminalis* (F.), a very dark male with the base of the wings covered with blackish scales, from Dungeness, with a normal male for comparison. *Orthosia stabilis* (Schiff.), a male with the reniform and orbicular stigmas coalesced and surrounded by a pale line. An almost black *Orthosia incerta* (Hufn.) and a very large black female of *Agrotis puta* (Hb.). *Ectropis bistortata* (Goeze), a second brood male of sooty-grey colouration, much less brown than variety *delamerensis*, White. *Ematurga atomaria* (L.), a female with white ground colour and two *Chiasmia clathrata* (L.), variety *nocturnata*, Fuchs, of first and second broods, taken at light at Bishops Waltham, with another specimen showing incipient darkening of the ground colour. *Nola albula* (Schiff.), a series of eight males and two females from a newly-discovered locality in South Hampshire, near Bishops Waltham. *Coscinia cribraria* (L.), examples from Dorset (one very black). *Tethea or* (Schiff.) and *T. octogesima* (Hb.), male and female examples from Bishops Waltham. *Orthosia advena* (Schiff.) = *opima*, Hb., an example from Bishops Waltham. *Cosmia pyralina* (Schiff.), a series. *Cryphia muralis* (Fors.), a series from Plymouth, Falmouth, Penzance and Eastbourne, showing considerable variation. *Pseudoips bicolorana* (Fuess.), a bred series from Bishops Waltham, a small male *Phragmataecia castaneae* (Hb.)

from Dorset, and a short series of *Cirrhia ocellaris* (Bkh.) from the Breck district, where it still appears to be plentiful. *Cosymbia annulata* (Schulze), a bred series. *Scopula immorata* (L.), a series from Sussex, and a series of *Siona lineata* (Scop.) from Wye, Kent. *Cleora cinctaria* (Schiff.), a series of the Scotch form from Struan, with New Forest examples for comparison. The Scotch examples contain a male and female of the white-banded form, and a female of a new albino variety not hitherto described.

Mr S. N. A. JACOBS—Twenty-three species of Microlepidoptera infesting stored products, including the following:—*Myelois ceratoneae*, Zell., *Ephestia cautella*, Wlk., *E. elutella*, Hb., *E. kühniella*, Zell., *Plodia interpunctella*, Hb., *Corcyra cephalonica*, Staint., *Aphomia gularis*, Zell., *Pyrallis farinalis*, L., *Hypsopygia costalis*, F., *Aglossa pinguinalis*, L., *Setomorpha rutella*, Zell., *Hofmannophila pseudospretella*, Staint., *Endrosis sarcitrella*, L., *Sitotroga cerealella*, Oliv., *Tineola bisselliella*, Hummel, *Tinaea pallescentella*, Staint., *T. pellionella*, L., *T. fuscipunctella*, Haw., *T. granella*, L., *T. ditella*, Pce. & Met., *Monopis rusticella*, Clerck, *M. ferruginella*, Hb., and a cross pairing (previously exhibited) between *H. pseudospretella* male and *E. elutella* female.

Mr O. J. JANSON—Exotic Coleoptera, *Goliathus signatus* and other rare Goliathinae from various localities, showing examples of sexual dimorphism.

Col. S. H. KERSHAW—Lepidoptera collected in Beds., Herts., and Northants in 1945, including:—*Lycaena phlaeas* (L.), abs. *aurocuneata*, B. & L., and *suffusa*, Tutt, and large females with arcus on forewings. *Lysandra coridon* (Poda), females deficient in spotting on undersides and approaching ab. *caeca*, Courv., and males and females showing variation in spotting and colour. *Lysandra bellargus* (Rott.), abs. near *obsoleta*, Tutt, ab. *basijuncta*, B. & L., ab. *antestriata*, B. & L., and other variations. *Maniola jurtina* (L.), females with pale patches on the forewings. *Aglais urticae* (L.), ab. *polaris*, Stdgr., with wide borders and other variations. *Pieris rapae* (L.), banded females. *Pieris napi* (L.), ab. *hibernica*, Schmidt (*citronae*, Frhk.), and banded females. *Chiasmia clathrata* (L.), minor variations. *Ematurga atomaria* (L.), an albino. *Bupalus piniarius* (L.), a melanic form.

Dr KETTLEWELL—A series of seventy *Pontia daphidice*, L., of which forty-seven were from fifty-four caught at Falmouth in July 1945. The remainder had been bred from wild ova found on *Sisymbrium officinale*, Scop., or laid in captivity by wild ♀♀s, and had hatched in late August and September. Two live pupae of same from a number of overwintering pupae. A large and perfect specimen of *Everes argiades*, Pall., a ♂, taken by him at Falmouth on 16th July 1945. A series of four *Herse convolvuli*, L., taken at Cranleigh, Surrey, August and September 1945. A series of *Colias hyale*, L., bred (3rd brood) from ova laid by a ♀ taken at Falmouth, 16.7.45. Also wild caught specimens from Dover area, August 1945. A series of a new form of *Panaxia*

dominula, L., having greatly increased markings on the forewings and diminished black markings on the hindwings; bred 1945. A series of *Arctia villica*, L., aberrations, including ab. *wardii*, and striated individuals, all bred or caught 1945. An aberration of *Aporophyla australis*, Boisd., taken at Tintagel, September 1945.

Mr A. R. KIDNER—Lepidoptera: *Apatele auricoma* (Schiff.), Seaford, Sussex, 1942. *Nola albula* (Schiff.), Seaford, Sussex, 1945. *Hydriomena furcata* (Thunbg.), extreme form, Bognor, 1914. *Xanthorhoe fluctuata* (L.), specimen with median band obsolete, Dulwich, 1904.

Lt.-Col. F. A. LABOUCHERE—*Colias hyale* (L.), taken at Folkestone and Birchington-on-Sea in the last week of September. Some had only just emerged, probably 3rd brood. *Colias croceus* (Fourc.). *Polyommatus icarus* (Rott.), from Scotland, taken end of July and beginning of August, rather late in the season. Melanic specimen of *Aglais urticae* (L.), taken in Sussex, 27th September 1945; hindwings completely black, forewings black and tawny-rose, only minute trace of blue.

Mr C. DE MORNAY—Illustrations drawn from life for the purpose of an educational film in course of production. Subject—Life of a Butterfly (*Papilio machaon*, L.).

Mr L. HUGH NEWMAN—*Pieris napi* (L.), ab. *hibernica*, Schmidt = *citronea*, Frhk., showing a wide range of variation, including some extreme banded forms, and one possibly unique specimen—a banded albino female, from a Scotch × Irish strain interbred for several generations, all the property of Mr E. D. Bostock, F.R.E.S. Also, on behalf of Mr G. Ellis, a fine series of Welsh *Pararge megera* (L.), including one lovely white variety in bred condition. Also, on behalf of Mr G. Wood, some remarkable *Panaxia dominula* (L.), forms bred from larvae obtained from the Bexley Butterfly Farm.

Mr D. A. ODD—British Rhopalocera, including *Maniola jurtina* (L.), varieties from Essex and Surrey, 1945, and pale forms from Surrey, 1941. *Argynnis cydippe* (L.), a specimen showing aberration of the hindwings, upper- and under-sides, Surrey, 1941, also two pale forms taken in Surrey, 1943, and an example with silver spots on upper side of hindwings. *Aglais urticae* (L.), ab. *nigra*, Tutt, Surrey, 1941. *Limenitis camilla* (L.), ab. *seminigrina*, Tutt, Sussex, 1945. *Papilio machaon* (L.), dark form of the ♀, Wicken Fen, 1943. *Lymantria monacha* (L.), dark form of the ♂, Sussex, 1945.

Mr A. F. O'FARRELL—(1) A collection of "clothes-moths" (*Tinaea* species) from Northern Ireland with notes on the occurrence of each species as observed during 1942-1945. *T. flavescetella*, Haw., seems the common household clothes moth in Belfast; with *T. pellionella*, L., not far behind. *Tineola bisselliella*, Hummel, is surprisingly scarce both in houses and elsewhere; *T. pallescentella*, Staint., is the commonest warehouse species of the genus. *Tinaea granella*, L., though somewhat local, is not uncommon, while *T. fuscipunctella*, Haw., is scarce and apparently only occurs in one or two flour mills. *T. metonella*, Pierce & Met., was encountered once. No *T. ditella*, Pierce &

Met., or *T. insectella*, F., were met with, but probably do exist in small numbers in suitable places—specimens from Bermondsey are shown in the exhibit for completeness. (2) A collection of "spider beetles" (Ptinidae) encountered indoors, mainly in warehouses, during the last few years. The dozen species shown are: *Gibbium psyllodes*, de Czem., *Mezium affine*, Boiel., *Stethomezium squamosum*, Hinton, (a species only very recently described from an infestation found in exhibits of tropical produce at the Imperial Institute in S. Kensington), *Trigonogenius globulus*, Solier, *Niptus hololeucus*, Fald., *Tipnus unicolor*, Piller & Mitt., *Eurostus hilleri*, Reitt., *Ptinus tectus*, Boiel., *P. fur*, L., *P. latro*, F., *P. hirtellus*, Sturm, and *P. raptor*, Sturm. Of these the first and last three species mentioned are more or less rare in Britain and not encountered in Northern Ireland by the exhibitor. (3) Some insects of general interest. Two specimens, out of a total of nine taken and fifteen seen, of *Celerio livornica*, Esp., from the 1943 immigration; locality Helen's Bay, Co. Down, probably the most northerly and westerly area in which anything more than odd specimens were seen. One specimen of *Heliothis peltigera* (Schiff.), taken at light indoors in S.E. London on 23.7.45. One specimen of the wingless Chalcid, *Theocolax formiciformis*, Westw., which attacks the woodboring beetles of the genus *Anobium*; this was taken in a mill in County Down. Two specimens of the bizarre Reduviid, *Empicoris culiciformis* (Deg.), which superficially resembles a mosquito; taken in a Belfast mill.

Messrs G. B. OLIVER and G. H. OLIVER—*Lycaena phlaeas* (L.), var. *discreta*, Tutt, bred from ova deposited by a var. *auroradiata*, B. & L., Royston, August 1945. *Strymon w-album*, Knoch, albino male (all normal black of wings, upper and undersides, replaced by a warm brown tint), probably unique; bred from larva beaten at High Wycombe, 1919. *Ochlodes venata* Brem. & Grey, a deeply toned female, hindwings with mere traces of the lighter transverse spots, the underside toned orange-russet; Hants., 1945. *Aphantopus hyperantus* (L.), male, an unusual underside. The buff scaling of the wings blurred over the outer portion of all wings; Bucks. Chilterns, 1945. *Euchloë cardamines* (L.), Gynandromorph; right wings male, left wings female, abdomen halved, and in addition the female forewing having a large splash, upper and underside of male coloration; from the collection of the late Dr H. D. Smart.

Mr R. W. PARFITT—Selection of Heterocera: (a) Bred during 1945, including *Leucania l-album* (L.), from S. Devon larvae; *Macroglossum stellatarum* (L.), *Aegeria andrenaeformis* (Lasp.), and *A. culiciformis* (L.), Guildford, Surrey; *Aegeria sphecoformis* (Schiff.), Oxshott and Ewhurst, Surrey; *Tethea ocularis* L., 1767 (*octogesima*, Hb., 1786) and *Cochlidion avellana*, L., Crowthorne, Berks. (b) Taken during 1945, including *Leucania vitellina*, Hb., and *Peridroma porphyrea*, Schiff., from Goodnestone, E. Kent, and Selsey, Sussex; *Hydraecia fucosa*, Freyer, var. *paludis*, Tutt, and *Omphaloscelis lunosa*, Haw., Selsey, Sussex; *Caradrina ambigua*, Fb., Guildford, Surrey, and Selsey, Sussex;

Orthosia miniosa, Fb., and *O. munda*, Esp., Witley, Surrey; *Agrotis clavis*, Hufn., *Heliophobus saponariae*, Esp., *Hemaris tityus*, L., and *Cerapteryx graminis*, L., from Guildford; *Aspilates gilvaria*, Fb., Rammore, Surrey; *Orthosia incerta*, Hufn., and *Achlya flavicornis*, L., a varied series, including two specimens of a dark form similar to the specimen figured on Plate III of the *Proceedings* for 1939-40; Crowthorne, Berks.

Mr C. G. PRIEST—Lepidoptera taken in the Isle of Wight in 1945, including *Vanessa atalanta* (L.), bred; *Pararge aegeria* (L.), *P. megera* (L.), *Polyommatus icarus* (Rott.), *Lysandra coridon* (Poda), *Lycaena phlaeas* (L.), *Cucullia asteris* (Schiff.), *Plusia chrysitis* (L.), and *Cryphia muralis* (Forst.).

Mr W. QUIBELL—A short series of *Aglais urticae* (L.) bred from a small brood of larvae collected on 5th September 1945, showing considerable variation: One *magnipuncta* (Raynor), two with lunals much enlarged; *cuneatiguttata* (Raynor); one *partimtransformis* (Leeds), one with spots on forewings very small and band on hindwings very restricted; two *caerulapicata* (Raynor), one of these having almost black hindwings—an extreme variety. *Eumenis semele* (L.)—A ♀ with extremely pale bands and another ♀ with pale markings very restricted, both taken on the Wiltshire Downs. *Maniola jurtina* (L.)—Four ♀♀; one *postfulvosa* (banded hindwings); one *commacula* (slate or grey ground colour); one *lacticolor* (cream or whitish); and one underside, a very extreme var., *antinigromargo postatrescens*. *Lycaena phlaeas* (L.), one var., *intermedia* (Tutt), *pallidula* (Leeds). *Lysandra coridon* (Poda)—One ♂ *postcuneata*, B. & L.; one ♂ underside, *pallidula*, Tutt; one ♂ underside, *obsoleta albo-nigrofimbriata*, B. & L.; one ♂ *obsoleta*, Tutt, underside; one ♂ *obsoleta*, Tutt, with small rounded hindwings; one ♂ underside, *postcaeca*, B. & L.; one ♀ *antipostsinis obsoleta*, B. & L.; one ♀ *glomerata confluens*, B. & L. (both these ♀♀ are undersides). All taken in 1945. *Nemeobius lucina* (L.), a ♂ var. with markings restricted on forewings and tawny radiations on hindwings (believed unique), also a ♀ of very pale colour.

Mr AUSTIN RICHARDSON—Six drawers containing Lepidoptera taken or bred in 1944-45 with, in many cases, the appropriate preserved larvae. This exhibit included: *Argynnis euphrosyne* (L.), a variety with central areas of hindwings black and outer spots of all wings rayed, Glos. *A. selene* (Schiff.), ab. *marphisa*, Späng., from Glos. *Aphantopus hyperantus* (L.), a khaki-coloured female, two others with xanthic areas, and examples of ab. *arete*, Mill., from Glos. *Colias croceus* (Fourc.), ab. *pallida*, Tutt, from Kent. *C. hyale* (L.) from Kent. *Maniola tithonus* (L.), from Cornwall, extra spotted forms and one with pale forewings. *Pontia daplidice* (L.), eight examples, including one bred from a pupa found in South Cornwall in September 1945, also pupa cases. *Lysandra bellargus* (Rott.), ab. *caeca*, Courv., and ab. *obsoleta*, Tutt. *Lysandra coridon* (Poda), ab. *caeca*, Courv. *Eucymatoge pini* (L.) = *togata*, Hb., from Aviemore, Perthshire. *Eupithecia tripunctaria*, H.-S. (*albipunc-*

tata, Haw. nec Hufn.), from Glos., with one ab. *angelicata*, Barr., and preserved larvae. *E. trisignaria*, H.-S., from Glos., with preserved larvae. *E. distinctaria*, H.-S., from Cornwall, with preserved larvae. *E. indigata*, Hb., from Aviemore. *E. pulchellata*, Steph., bred from Aviemore, 1500 ft., and larva. *E. jasioncata*, Crewe, and larvae, from Cornwall. *Polia tincta* (Brm.), and larva, from Aviemore. *Eurois occulta* (L.) and larvae, from Aviemore. *Electrophaës corylata* (Thunb.), ab. *albocrenata*, Curt., from Aviemore. *Leucania loreyi*, Dup., four specimens taken in September 1945, also one *L. unipuncta* (Haw.), and five *L. vitellina*, Hb., all three species from Cornwall, and *L. albipuncta* (Schiff.), ten specimens from Kent. A series of hybrids of *Tethea ocularis*, L. 1767 (*octogesima*, Hb. 1786) \times *T. or.* Schiff. A long series of *Amathes alpicola* (Zett.) (*hyperborea* (Zett.)) (= *alpina*, Hump. & West.) with larvae and an empty pupa, from Aviemore. *Hyppa rectilinea* (Esper) and larvae, from Aviemore. *Apatele euphorbiae* (Schiff.), var. *myricae*, Guen., and larva, from Aviemore. *Apatele alni*, L., from Glos. *Craniophora ligustri* (Schiff.), var. *olivacea*, Tutt. *Lygephila* (*Toxocampa*) *craccae* (Schiff.), from Cornwall. *Eumichitis adusta* (Esper), from Aviemore. *Heliothis peltigera* (Schiff.), from Kent and Gloucester, with four larvae, showing colour variation. *Gortyna flavago* (Schiff.), bred from larvae and pupa, found in foxglove stems in Cornwall, and larvae. *Anarta cordigera* (Thunb.) and larvae, from Aviemore. *Lasiocampa trifolii* (Schiff.), from Dungeness, including four white forms, the bandless form, and two bandless yellow forms, and a larva. A long series of *Cleora cinctaria* (Schiff.), from Perthshire, including banded black-and-white forms and four new albino varieties with a series from the New Forest for comparison, and a larva. *Ortholitha scotica*, Cckne., from Aviemore, including melanic and semi-melanic forms. A rayed form of *Cosymbia pendularia* (Clrk.), bred from a larva taken at Aviemore.

Mr J. A. RILEY—Specimens of the Dragonfly, *Sympetrum flaveolum*, L.

Mr W. L. RUDLAND—Adults of *Acrolepia assectella*, Zell. (Lep. Plutellidae), from the Hants. coast and Isle of Wight, together with larvae, larval mines, pupae and cocoons. Since its first appearance in Sussex in 1943 it has now spread in a narrow coastal belt from the Isle of Wight to Suffolk. On the Continent it is not a maritime species.

Mr A. G. B. RUSSELL—Series of 17 *Apamea exulis*, Lef., from Shetland, and one from Dalwhinnie, Co. Inverness; 20 *A. exulis*, var. *assimilis*, Dbld., from Rannoch; 28 *Zygaena achilleae*, Esp., from Co. Argyll, and 12 *Cleora jubata*, Thunb., a finely marked black and white race, from Gatehouse-of-Fleet, Co. Kirkcudbright; two *Apatele rumicis*, L., ab. *salicis*, Curtis, from Co. Argyll; and single specimens of *Hada nana*, Hufn., a remarkable black form resembling ab. *latenai*, Pierr., but with the veins and lines white, from Co. Argyll; *Celaena leucostigma*, Hb., a black ab. with the outer fascia pale ochreous, from Rannoch; *Cerastis rubricosa*, F., ab. *mucida*, Esp.; *Diarsia festiva*, Schiff., ab. *grisea*,

Tutt, the two latter from Gatehouse-of-Fleet; *Amathes castanea*, Esp., a dwarf ab. of a dark purplish brown tint; *Ematurga atomaria*, L., ab. *unicoloraria*, Stgr., the two latter from Co. Inverness; *Colias croceus*, Fourc., an aberration exhibiting albinism in the left fore and hindwings, from Swanage; and *Maniola jurtina*, L., a fine example of a rare apricot tinted form, from the neighbourhood of Salisbury.

Mr L. A. E. SABINE—*Argynnis euphrosyne*, L., black, broadly rayed with orange towards outer margins, North Sussex, May 1945. *Argynnis selene*, Schiff., varieties, two males, rayed and obsolete forewings, black hindwings. A ♂ with black forewings, except two small areas in centre of wings. A very beautiful ♂, rayed and with great increase of intense black on all wings. A large ♀ with rayed and obsolete hindwings, etc., North Sussex, 1945.

Mr B. B. SNELL—*Carterocephalus palaemon*, -Pall., *Hamearis lucina*, L., *Heliothis peltigera*, Schiff., *Eupithecia icterata*, Vill., *E. centaureata*, Schiff., all from Rutland; *Smerinthus ocellatus*, L., *Mimas tiliae*, L., *Hyloicus pinastri*, L., two specimens bred in 1935 and 1936, one of which was melanic, the last three species from Suffolk; *Achlya flavicornis*, L., *Erannis leucophaearia*, Schiff., and var. *merularia*, Weym., *Argyroprocle corticana*, Schiff., from Delamere, Cheshire; *Perizoma bifasciata*, Haw., *Eupithecia absinthiata*, Clerck, *E. linariata*, Schiff., *Ecliptopera silaceata*, Schiff., *Deuteronomos fuscantaria*, Haw., *Limnœcia phragmitella*, Staint., *Coleophora tripoliella*, Hodg., *Laspeyresia pomonella*, L., *Lampronia morosa*, Zell., *Lyonetia clerkella*, L., from Cheshire; and *Mesoleuca albicillata*, L., and *Argyroprocle arcuella*, Clerck, from Windermere.

Mr A. E. STAFFORD—Aberrations of *Lysandra coridon*, Poda—Male (uppersides): abs. *partim-transformis*, B. & L., *melaina*, Tutt, *pulla*, B. & L., *fowleri*, South; male (undersides): *anti-caeca-obsolescens*, B. & L., *anti-caeca-post-radiata*, B. & L., *caeca-obsolescens*, B. & L., *caeca-fowleri*, B. & L., *anti-caeca*, B. & L., *obsolescens*, Tutt, *fowleri-obsoleta*, B. & L., *fowleri*, South; female (uppersides): *fowleri*, South, *inaequalis*, Tutt; female (undersides): *confluens-glomerata*, B. & L., *fowleri-post-caeca*, B. & L., *pulla*, B. & L. All taken from Sussex and Surrey Downs in July and August 1945.

Mr G. STOUTGTON-HARRIS—*Apatura iris*, L., female; *Argynnis paphia*, L., var. *valesina*, Esp.; *A. aglaia*, L., small male; *Maniola jurtina*, L., three females, one bi-pupillated and with black spot, one with pale areas on forewings, and one with light edges to all wings; *Polygonia c-album*, L., small, with dark shading and absence of markings on edges of all wings; *Lysandra bellargus*, Rott., three males, two of them *obsoleta*, one being very marked and with absence of spots on outer margins of all wings; *L. coridon*, Poda, six males, six females, including one var. *syngrapha*, Kef., one of the males greenish and one dwarf. The others showed variations of marking on undersides, two being var. *obsoleta*, Tutt. Two of the females were blue on the hindwings with

well-marked discal spots on forewings. The others showed variations of marking on the undersides.

MR F. H. TOMPKIN—*Erebiu aethiops*, Esp., series taken at Arnside, Westmorland, August 1945; *Maniola jurtina*, L., pale form, Surrey, 1945.

MR H. G. TUNSTALL—Series of the following: *Eremobia ochroleuca*, Schiff., and *Thalpophila matura*, Hufn., Sompting, Sussex; *Discoloxia blomeri*, Curt., Chalfont, Bucks.; *Polychrisia moneta*, F., Ewell, Surrey; and *Abraxas sylvata*, Scop., Chalfont, Bucks. Also a red-brown tile with pupa and cocoon of *Cerura vinula*, L., the cocoon being the same colour as the tile. It would seem that roughened pieces of the latter must have been bitten off by the larva to obtain the dust for coloration, Sompting, Sussex.

MR S. WAKELY—Lepidoptera captured or bred during 1945, including *Polygonia c-album*, L., var. *hutchinsoni*, Robs., bred from larva found on nettle at Warnham, Sussex; *Cosmia pyralina*, View., a pair taken at sugar, Warnham, Sussex; *Meristis trigrammica*, Hufn., a series of varied forms from Warnham, taken at sugar; *Agrotis exclamationis*, L., varied series, including brownish forms; *Tethea or*, Fabr., bred 4th August, from a larva found on aspen at Warnham in June; *Homoeosoma binaevella*, Hb., bred from Ashtead larvae; *Urambus uliginosellus*, Zell., Byfleet, Surrey; *Pyrausta cingulata*, L., Boxhill, Surrey; *Loxostege sticticalis*, L., a specimen of this local insect, taken at the Society's Field Meeting at Boxhill on 18th August; *Cynaeda dentalis*, Schiff., from larvae, Betchworth, Surrey; *Agdistis staticis*, Mill., from larvae found at Branscombe and Beer, South Devon, by Dr K. G. Blair; *Eucosma sinuana*, Hb., Ashtead, Surrey; *Argyroprocle bifasciata*, Haw., Weybridge, Surrey; *Aristotelia unicolorella*, Dup., Kingsfold, Sussex; *Gelechia velocella*, Dup., Weybridge, Surrey; *Mompha stephensi*, Staint., Ashtead; *Schiffermuelleria tripuncta*, Haw., Ashtead; *Gracilaria cuculipennella*, Hb., bred series from Warnham, Sussex; *Cataplectica fulviguttella*, Zell., larvae in seedheads of *Angelica sylvestris*, Effingham, Surrey; *Eidophasia messingiella*, F.R., Warnham and district; *Opostega crepusculella*, Zell., Tilgate Forest; *Bucculatrix boyerella*, Dup., Ashtead; *Nemotois minimella*, Zell., and *N. cupriocella*, Hb., short series swept among *Scabiosa succisa* at Kingsfold, Sussex; *Nepticula sericopeza*, Zell., Kingsfold, Sussex. Also a box of insects taken or bred by P. P. Milman in South Devon, including *Euplagia quadripunctaria*, Pod., a very large specimen with red hindwings; *Orthosia gothica*, Linn., very dark specimens; *Laphygma exigua*, Hb., *Leucania vitellina*, Hb., *L. l-album*, Linn., and *Heliothis peltiger*a, Schiff. Also a fine specimen of *Chrysoclista bimaculella*, Haw., taken by Mr A. Smith of York at Haxby.

MR H. O. WELLS—Varieties of *Lysandra coridon*, Poda, taken at Royston, Herts, and on the Surrey Hills during 1945, including a ♀ with underside pure white with small black spots.

Mr A. GRANVILLE WHITE—(1) Framed water-colour drawing showing six stages in figuring an insect in colour. (2) Framed water-colour drawing of three aberrations of *Argynnis euphrosyne*, L. (3) Small case containing aberration of *Euchloë cardamines*, L., ♀, with typical specimens for comparison.

Mr G. C. WOOLLETT—Some interesting forms of *Euphydryas aurinia*, Rott., taken from a brood of about 450 bred in his garden on *Scabiosa succisa*, L. Ova were deposited in May 1944, the larvae hatched in the following August, pupated in April 1945, and emergence took place a month later.

Mr N. G. WYKES—*Pontia duplidice*, L.—Five specimens (three ♂♂, two ♀♀) taken 7th-9th September, in lucerne fields behind Birchington (I. of Thanet). Certainly bred in this country. *Colias hyale*, L.—Eight ♂♂, five of second brood (August) from Kent and Wilts; three of third brood from Birchington (September). *Pieris rapae*, L.—One partially banded ♀, two ♀♀ with bright yellow undersides (September). *Polygonia c-album*, L.—One ♂ with dark mahogany ground-colour (Eton, September), with typical ♂ for comparison. *Aglais urticae*, L.—♂, with forewing black marking at base of 1-2 much reduced. ♀, with ground-colour yellowish-pink. ♂, with submarginal spots in 2-3, 3-4 almost obsolete. All from E. Sussex (August). *Coenonympha pamphilus*, L.—2 ♂♂ (one light, one dark, from Chilterns, June). *Plebejus argus*, L.—A series from Aldershot area, composed of the following forms: Uppersides—♂, *lavendula-fuscamargo*, *postsuffusa*, *caerulea*; ♀, *post-transformis*, *radio*, *postradio*, *inaequalis* (2). Undersides—♂, *rufescens*, *flavescens*, *peraurantia*, *partim-transformis*, *pulla*, *ultranubila*, *discreta*, *glomerata*, *discoelongata*, *parvipuncta*, *costajuncta*, *post-sagittata*, *minor*; ♀, *pulla*, *postcentrijuncta*, *unipuncta*, *costa-basijuncta*, *basijuncta*, *costajuncta*, *sagittata*, *postradiata*, *discoelongata*, *glomerata*, *discreta*, *retroelongata*, *aurescens*, *aurantiextensa*, *parvipuncta*. *Polyommatus icarus*, Rott.—From Eton, Salisbury, and Folkestone (August): Upperside—♀, *peraurantia* (one *brunnescens*, one *caerulea*). Underside—♂, *postcaeca*, *ultradiscreta*, *discoelongata*, *discreta*, *arcuata*, *i-nigrum*; ♀, *discreta*, *discoelongata*, *i-nigrum*, *ultradiscreta-postobsoleta*. *Lysandra coridon*, Poda: Upperside—♂, *cinereamargo*, *suavis*, Schultz, *metallica*, *inframarginata*, *marginata*, Tutt (costa black almost to base, and all veins strongly marked with black), *lavendula-minutissimus*, *ultracaeruleo*, *lavendula*; ♀, *brunnescens*, Tutt, *punctata*, Tutt, *fowleri*, South. A gynandromorph (all ♂, except right hindwing, which is half ♀). Underside—♂, *alba*, Tutt, *albescens*, Tutt, *postfulvescens*, *pulla*, *digitata*, Courv., *lunaextensa*, *juncta*, Tutt, *bi-i-nigrum*, *arcuata-i-nigrum*, *antecaeca*, *postcaeca*, *caeca*, Courv., *obsolescens*, Tutt, *alba-sagittata*, *post-trielongata*; ♀, *discojuncta-bi-i-nigrum*, *postgrisea*, *pulla*, *postdiscoelongata*, *fulvescens-ultranubila*, *bi-i-nigrum-basijuncta*, *antecaeca*, *postcaeca*, *caeca*, Courv., *discreta*, Tutt, *glomerata*, Tutt. *Lysandra bellargus*, Rott.: Upperside—♂, *partim-transformis*, *violascens*; ♀, *peraurantia*, *inaurantia*. Underside—♂, *glomerata*, *pulla*, *postobso-*

leta, *obsoleta-pulla* (with dusted blue scaling in central area of forewings and towards anal angle of hindwings); basal scaling bright green); ♀, *postcaeca* (all from Folkestone, September). Unless otherwise stated varietal names are those used in Bright and Leeds, *A Monograph of the British Aberrations of the Chalk-Hill Blue Butterfly* and Addenda. Drawings in colour also exhibited: (1) Plate showing figures of *Lysandra coridon* and the following allied species—*L. meridionalis*, Tutt, subspecies *recnizeki*, Bart., and subspecies *constantii*, Riv., ♂ and ♀ upper and underside of each; subspecies *hispana*, ♂ upper and underside. *L. arragonensis*, Gerh., and subspecies *albicans*, Bois., ♂ and ♀ upper and undersides of each. *L. coelestissima*, Verity, ♂ upper and underside. (2) Plate showing forms of *Apatura iris*, L.: ♂ upper and underside of both the typical form and of ab. *iote*, Schiff. ♂ upperside of ab. *semi-iote*, Frhk. ♀ upper and underside of typical form and female upperside of ab. *iote*, Schiff.

BARON DE WORMS—Series of Butterflies: *Pieris napi*, L., showing dark underside and well-marked uppersides; Fort William, Scotland, 1945. *Colias hyale*, L., 14 males and 2 females taken near Folkestone and Birchington, Kent, August and September 1945. *Eumenis semele*, Hb., taken near Salisbury, Wilts., July 1944 and 1945. *Polyommatus icarus*, Rott., from Formby, Lancs., May 1945, showing large and well-marked females. *Plebejus argus*, L., var. *cretaceus*, Tutt, taken near Eynsford, Kent, June 1945. *Lysandra coridon*, Poda, taken in Salisbury and Sussex, 1944 and 1945, including vars. *fowleri*, South, male; *punctata*, Tutt, males (one grey example); specimens of *obsoleta*, Tutt, forms including var. *caeca*, Courv., male and female; and var. *albescens*, Tutt, male. Series of Moths: (1) *Cerura hermelinea*, Goetz., bred Salisbury, Wilts., 1904. (2) *Lasiocampa trifolii*, Schiff., bred Formby, 1945. (3) *Parasemia plantaginis*, L., bred Hants. and Salisbury, 1944. (4) *Craniophora ligustri*, Schiff., bred Salisbury and S.W. Scotland. (5) *Apatele euphorbiae*, Schiff., var. *myricae*, Guen., 1944 and 1945. (6) *Apatele menyanthidis*, View., Aviemore, 1945. (7) *Actebia praecox*, L., bred Formby, 1945. (8) *Rhyacia simulans*, Hufn., taken Cotswolds, 1945. (9) *Agrotis alpicola*, Zett. (*hyperborea*, Zett.), bred Aviemore, 1944. (10) *Luperina testacea*, Schiff., dark forms, Swanage, 1945. (11) *Hyppa rectilinea*, Esp., Aviemore, 1945. (12) *Nonagrius sparganii*, Esp., bred Sussex and Kent, 1945. (13) *Aporophyla australis*, Bois., Swanage, 1945. (14) *Rhizedra lutos*a, Hb., Southampton, 1945. (15) *Oria musculosa*, Hb., Salisbury, 1944. (16) *Cucullia lychnitis*, Ramb., bred Salisbury, 1944. (17) *Anarta cordigera*, Thnbg., series showing dark and light forms, Aviemore, 1944. (18) *Anarta melanopa*, Thnbg., Aviemore, 1945. (19) *Ortholitha scotica*, Ckne., Aviemore, 1945. (20) *Epirrhoë rivata*, Hb., bred Salisbury, 1945. (21) *Epirrhoë tristata*, L., Fort William, 1945. (22) *Hydriomena impluviata*, Schiff. (*coerulata*, Fb.), varied forms, Aviemore, 1945. (23) *Philereme vetulata*, Schiff., bred Salisbury, 1944. (24) *Gnophos obscurata*, Schiff., long series showing pale grey and banded forms, Folkestone, 1945. (25) *Ino globulariae*,

Hb., Salisbury district, 1944. Uncommon species, varieties, and aberrations of *British Lepidoptera* taken during 1944 and 1945:—(1) *Argynnis euphrosyne*, L., well marked form with dark hindwings from Hants. and short series from Aviemore showing well-marked males and pale females. (2) *Pieris napi*, L., cream females from Aviemore. (3) *Leptidea sinapis*, L., var. *erysimi*, Bork., female, Chiddingfold, *Springbrood*, May 1945. (4) *Pontia daphidice*, L., male, N. Kent, taken September 16, 1945. (5) *Maniola jurtina*, L., var. *anommata*, male (apical spot absent), Folkestone, August 1945. (6) *Vanessa cardui*, L., male with pale markings on forewings, Cornwall, August 1945. (7) *Cryphia perla*, Schiff., dark and yellow forms, Folkestone, August 1945. (8) *Epirrhoe rivata*, Hb., 3 females, bandless forms, very uncommon, bred Salisbury, 1945. (9) *Thera obeliscata*, Hb., melanic form, Formby, Lancs., May 1945. (10) *Zygaena lonicerae*, Schv., two yellow forms (var. *flava*, Ober.) from the Cotswolds, July 1945.

7th NOVEMBER 1945.

The PRESIDENT in the Chair.

The following new members were declared elected: Messrs L. H. Newman and V. W. Philpott.

The President, Captain R. A. JACKSON, showed a short series of *Rhizodra lutos*, Hb., taken in September, near Southampton. The species occurs fairly plentifully on the south side of the main Southampton-Bournemouth road, just before entering Totton. Hardly any insects were to be found in the large reed beds in the water meadows on the north side of the road, the species preferring the straggling reeds in drier ground on the south side. It was pointed out that the race appeared to be larger than usual, one or two of the males shown being of unusual size.

Mr C. N. HAWKINS, on behalf of Dr K. G. BLAIR and himself, exhibited imagines of both sexes of the moth, *Sedina büttneri*, Her., from the Isle of Wight. This moth, closely allied to *Rhizodra lutos*, was new to the British Isles and was first taken by Dr Blair.

Mr S. N. A. JACOBS on behalf of Mr W. L. RUDLAND, presented specimens of *Acrolepis assectella*, Zell., to the Society's collection. On his own behalf, a fungus (probably *Daldinia concentrica*, Ces. and De Nat.) on Ubeche wood from the Gold Coast.

Mr J. O. T. HOWARD exhibited a collection of beetles taken while serving in Ceylon.

Mr W. J. FINNIGAN exhibited the fungi, *Hydnum repandum* (L.), Fr., *H. ferrugineum*, Fr., *H. melaleucum*, Fr., and *Polyporus perennis* (L.), Fr., from Oxshott, Surrey.

Mr W. H. SPREADBURY exhibited the fungus, *Isaria farinosa*, Fr., the conidial condition of *Cordyceps militaris*, Fr. This fungus attacks Lepidopterous pupae.

Mr T. R. EAGLES showed berries of the shrub Murasaki (*Callicarpa japonica*, Thnbg.).

A letter from Lt.-Col. W. G. B. HAWLEY, D.S.O., was read reporting the occurrence of *Laphygma exigua*, Hb., in Wiltshire.

BARON DE WORMS reported that *Heliothis armigera*, Hb., had recently been taken.

Reports of the following Field Meetings were read:—Holmwood (Mr Ensor), Oxshott (Mr Finnigan), and Ashted (Mr Spreadbury).

Mr L. T. FORD read a paper on "The Psychidae" (see *Trans.*) and showed the imagines and larval cases of the British species. A discussion followed, during which Dr H. E. Hinton dealt with the place of the Psychidae in the classification of the Lepidoptera and suggested that they arose in the Lower Cretaceous epoch. Dr Steven Corbet spoke of his experiences when collecting Psychidae in Malaya.

28th NOVEMBER 1945.

The PRESIDENT in the Chair.

The names of the proposed Officers and Council for 1946/47 were read.

It was announced that Mr J. Fincham-Turner had presented to the Society a copy of *British and Foreign Beetles*, by Duncan.

The following were declared elected members:—Mrs Heslop, Dr E. Barton White, Messrs J. W. Saunt, G. G. Edwards, E. Milne-Redhead, H. K. Airy Shaw, G. J. Wood, C. H. Dixon, R. C. Edwards, H. A. Morrell, W. Quibell, H. E. Webb, G. H. Youden, B. W. Weddell, I. D. Parsons, L. J. Evans, J. H. Grant, and S. E. W. Carlier.

The PRESIDENT showed a series of moths of the genus *Oporinia*, mostly bred from Bishops Waltham, Hants., during 1945. A number were probably *autumnata*, Schiff., but the majority *dilutata*, Borkh., although differentiation is difficult due to the large number of females bred. The females of the presumed *dilutata*, Borkh., showed a range of colour from pale grey to dark brown, the majority tending towards melanism.

Mr R. F. HAYNES exhibited a few examples of a Continental species, *Saturnia spini*, Schiff. (shown in W. E. Kirby's *Butterflies and Moths of Europe* as the Austrian Emperor), which he bred from larvae found by him last year (1944) at Eboli near Salerno in Italy. Two British examples (a male and female) of *Saturnia pavonia* (L.) were shown alongside for comparison.

BARON DE WORMS exhibited synthetic specimens of the butterfly wing pigments Xanthopterin and Leucopterin, and read the following note: "Leucopterin occurs in *Pieris brassicae* (L.) and most others of that group. Xanthopterin in *Gonepteryx rhamni* (L.), many Appias and Coliads. Both materials are closely related to uric-acid. Leucopterin can be formed by oxidation from Xanthopterin. Sir Gowland Hopkins was one of the first to isolate these pigments from Pierids. Xanthopterin in dilute alkali solution gives a distinct green fluorescence, more intense under Ultra Violet Lamp. Special mention is made of these pig-

ments in Dr E. B. Ford's book, *Butterflies*, but little is known about their mode of synthesis in the living insect." Acknowledgments were made to Dr Ross and Professor G. A. R. Korn, of Messrs Organon Ltd., and the Royal Cancer Hospital for their kindness in supplying the specimens for exhibition.

Mr W. H. SPREADBURY exhibited (1) the fungus, *Schizophyllum commune*, Fr.; (2) leaves of *Viola odorata*, L.; var. *dumetorum*, Jord., galled by the Cecidomyid fly, *Dasyneura affinis*, Kieff.; (3) white coloured droppings of *Rattus rattus*, L. (the Black Rat), the colour being due to the animal having eaten plaster.

Mr E. W. CLASSEY read a paper on " British Mosquitoes " (see *Trans.*), illustrated by lantern slides.

28th NOVEMBER 1945.

SPECIAL MEETING.

Burlington House, Piccadilly, London, W.1.

Mr S. N. A. JACOBS, Vice-President, in the Chair.

The notice convening the meeting was read and the Secretary explained the reasons for seeking to make possible the re-election of Capt. R. A. Jackson, R.N., to the office of President for a second year. The following resolution was proposed by Mr F. Stanley-Smith, seconded by Dr E. A. Cockayne, and carried unanimously:—" That after the words ' except that ' in Bye-Law 4 (c) there be inserted the words ' save during the period between the Annual Meeting of 1945 and the Annual Meeting of 1947 '."

12th DECEMBER 1945.

The PRESIDENT in the Chair.

The gift by Mr V. E. August of a copy of Dr E. B. Ford's recently published book *Butterflies* was announced.

The following were declared elected members: G. V. Owen, A. R. Davidson, Lt.-Col. W. B. L. Manley, Dr O. W. Richards, W. D. H. Brown, G. B. Manley, L. Birch, C. Timms, Cpl. J. H. Corbett of U.S. Army, J. Heath, Dr Jean Michaud, R. W. Watson, C. B. Pratt, and A. J. Wheeler.

Mr H. R. LAST exhibited several cases containing representative series of British beetles of the family Staphylinidae in illustration of his paper subsequently read.

Mr W. H. SPREADBURY exhibited Ergot of Rye, *Claviceps purpurea*, Tul., on the grass, *Deschampsia caespitosa*, L. He quoted Mousse's description: " Mycelium developing in the ovary of various grasses and forming first a whitish, minutely velvety body on the surface of the ovary, covered with conidiophores bearing very minute conidia. These can affect immediately other plants in the vicinity. Next the sclerotium increases in size and becomes horn-shaped and purple-black. These later give rise to several stipitate subglobose, purplish, warted stromata

(hence 'claviceps')," and added the following note: "The stromata shed spores from asci which infect the spring plants. When ergots are included in the diet both animals and man can be seriously affected. Rye is particularly susceptible hence the incidence of Ergotism in countries where black bread is the staple food."

Mr F. T. GRANT exhibited the following two beetles new to the Gravesend, Kent, district:—*Cnemidotus caesus*, Duft., *Cryptocephalus punctiger*, Pk., also *Anthonomus chevrolati*, Desb., and a black variety of *Athous vittatus*, F.

Mr E. W. CLASSEY showed larvae of *Sterrhia rusticata*, Fb., bred from moths captured in N.W. Kent in July 1945. Feeding on withered dandelion leaves. He drew attention to the fact that the setae are shaped like a table-tennis racket.

Mr T. R. EAGLES exhibited pupae (from India) of the Sphingid moths, *Daphnis nerii*, L., and *Acherontia styx*, Westwood.

Mr H. R. LAST read his paper, "Collecting Notes on the British Staphylinidae" (see *Trans.*). A discussion followed.

9th JANUARY 1946.

The PRESIDENT in the Chair.

The following were declared elected members:—Messrs John Thorpe, W. Parkinson-Curtis, F.R.E.S., and G. C. Holroyd.

The PRESIDENT showed a short series of different forms of *Erannis defoliaria*, Clerck, recently taken at Bishops Waltham, Hampshire. One specimen showed considerable melanism, and was thought by the exhibitor to be almost as dark as those specimens hitherto believed to be confined to the Epping Forest.

Mr C. N. HAWKINS exhibited four male specimens of *Colias hyale*, L., bred from eggs laid by a ♀ taken at Freshwater, Isle of Wight, on 8th October 1945. The ♀ was placed in a cage with sprays of *Lotus* and *Trifolium* and laid 21 eggs before she died on 14th October. Five eggs were infertile, five developed more or less but did not hatch, five larvae died, and one was preserved; one pupa (a ♀) died and four imagines were bred. The eggs began to hatch on 25th October, and the larvae and pupae were forced in a temperature of about 70° F. The imagines emerged on 30th November and 1st December 1945, and are rather heavily marked with black on the borders of both fore and hindwings though this varies considerably in the different specimens.

Mr I. R. P. HESLOP exhibited two tails of Fallow Deer from specimens shot by him in January 1940 (one in Wiltshire, England, and one in Perthshire, Scotland). He communicated the following note:—"Some remarks on races of the Fallow Deer (*Cervus dama*, L.) in Britain. The difference is very striking, the Perthshire tail entirely lacking the profuse white fringes of the Wiltshire tail. The exhibits were chosen at random from among a considerable number of specimens showing (male and female alike) exactly the same characteristics according to their respective localities. There is a corresponding differ-

ence in the ears, which have dark hair inside in the Perthshire specimens and white hair inside in the Wiltshire specimens: unfortunately it is not at the moment possible to exhibit the heads. The Wiltshire race may be taken as typical of Southern England (park and feral). The Perthshire race may be taken as typical of a race that at one time probably inhabited a large area in the Scottish Highlands; and that is still found in its purity, in a completely wild state, both in the woods and on the bare hills of central Perthshire. Local tradition in Perthshire has it that this is the last remnant of the 'indigenous' British Fallow Deer. Whether the Perthshire race is truly indigenous or not (and there is no evidence of escape or dispersal from any park), it is certain that in other parts of the Highlands there has in the last century or two been much introduction of English and possibly of foreign blood. [The tails of specimens shot in Dumbartonshire in December 1939—not exhibited—are very similar to Wiltshire ones.] It does not appear that the difference demonstrated has previously been zoologically noted. There is no question of seasonal variation since all the material studied (both Wiltshire and Perthshire) was obtained in the space of eleven days."

Mr L. G. PAYNE exhibited the following Coleoptera: *Ceuthorrhynchus posthumus*, Germ., by sweeping from the native plant, *Teesdalea nudicaulis* (L.), Mattersey Common, Notts, 17.4.45. *Phyllobius artemisiae*, Desbr., ♂, by sweeping, Hatfield, Yorks, 15.4.45; ♀, from flood refuse, River Ouse, Yorks, 17.4.45. *Criocephalus polonicus*, Muls., from soot and mortar of old chimney, Wimbledon, 5.7.45.

Mr J. O. T. HOWARD exhibited *Hydrillula palustris*, Hb., Wood Walton Fen, June 1939, recorded by Edelsten, *Entomologist*, April 1944. *Acherontia styx*, Westd., Ceylon, 1945, for comparison with *A. atropos*, L. *Erannis defoliaria*, Clerck, melanic forms from Epping Forest (Chingford), 1938.

Mr W. H. SPREADBURY showed cherry galls of the oak with newly emerged imago, *Cynips* (= *Dryophanta*) *quercus-folii*, L.; and the Mycetozoon, *Stemonitis fusca*, Roth, from Oxshott, Surrey.

There followed an exhibition of lantern slides by Messrs W. H. SPREADBURY and W. J. FINNIGAN.

23rd JANUARY 1946.

ANNUAL MEETING.

(With which was combined the Ordinary Meeting.)

Captain R. A. JACKSON, R.N., President, in the Chair.

Reports of the Council and Treasurer, with the Balance-Sheet and Accounts, were read and adopted. A hearty vote of thanks to the generous donors to the funds during 1945 was proposed from the Chair, and carried with acclamation.

The following members were declared elected as Officers and Council for the ensuing twelve months:—*President*—Captain Reginald A. Jackson, R.N., F.R.E.S. *Vice-Presidents*—L. T. Ford, Colonel P. A.

Cardew. *Treasurer*—J. L. Henderson. *Secretary*—F. Stanley-Smith, F.R.E.S. *Editor of Proceedings*—T. R. Eagles. *Curator*—F. J. Coulson. *Librarian*—E. E. Symes, F.R.E.S. *Ordinary Members of Council*—E. W. Classey, F.R.E.S.; H. G. Denvil; W. J. Finnigan; C. N. Hawkins, F.R.E.S.; J. O. T. Howard, M.A.; Stanley N. A. Jacobs; H. B. D. Kettlewell, M.A., M.B., etc.; H. R. Last; Sir Leonard Wakely, K.C.I.E., C.B.; the Baron de Worms, M.A., Ph.D., etc.

The following were declared elected members:—Miss Daphne Derby, B.Sc., Mr R. Kaufmann, and Mr A. T. Goodman.

Exhibit by Colonel P. A. CARDEW—The genus *Oporinia*—a few specimens each of *O. dilutata*, Schiff., *christyi*, Prout, and *autumnata*, Borkh., with brief notes on their standing as distinct species.

A discussion followed.

Mr T. R. EAGLES exhibited a spray of the evergreen shrub, *Pittosporum tenuifolium*, Banks & Soland., on sale in London for decoration.

The PRESIDENT then read his address.

PRESIDENT'S ADDRESS.

Ladies and Gentlemen—You will have realised from the Reports of the Council and of the Treasurer, that our Society is in a most flourishing condition, albeit the question of finance is an ever-present source of anxiety, since money, unfortunately, is largely the limiting factor governing the size and attractiveness of our *Proceedings and Transactions*.

It is extremely satisfactory that our membership stood at well over 300 at the end of the year whilst the number of new members admitted is a record in the life of the Society. A growing membership is always a sign of health, and I would ask you all to do what lies in your power to bring in new members, and more especially younger men. Many who do not belong to a Society feel diffident about asking an acquaintance how they can join, although they would be only too ready to belong were they to be invited. I know this from my personal experience, for I would have joined this Society many years ago had I ever been invited. The larger the membership the more money we can put into our Publications, since the addition of, say, 50 members adds but little to the working costs of the Society. May I ask you, one and all, therefore, to make a great effort during the coming year—I shall not be satisfied unless we can pass the 400 mark during the next twelve months.

I must now turn for a moment to the course of events which has led to our translation to the neighbourhood of Piccadilly, and which has been referred to in the Council's report. My Naval duties have had much to do with the finding and occupation of new premises, necessitated by war-time expansion, or war damage, and these have not been made less harrowing by the natural desire of the rightful owners to eject us as soon as possible, leaving us with "no place to go." It really seemed, therefore, almost beyond a joke when no sooner had I been in-

stalled as President than we were told that we must leave the Chapter House, and the sooner the better!!

Hearing of our predicament, the Council of the Royal Entomological Society once more came to the rescue and offered us the use of their Meeting Room, and our most sincere thanks are due to them for their kindness. However, the acceptance of their offer could, of course, have been only a temporary expedient, and it seemed essential that we should find permanent quarters as soon as we could. The report of the Council has told you of the difficulties of the search and we can never be sufficiently thankful to the President and Council of the Royal Society for letting us come here.

I think we are all agreed that never before have we had such good facilities for our meetings and exhibition, but I feel that there is a danger to be guarded against. We must never lose that sense of friendliness and personal contact which has always been such a feature of the South London.

When I first joined, I was struck immediately with the kindly atmosphere and camaraderie of the members, and this is of particular importance if we are to add to our numbers and enrol more members, especially younger men. Our meetings must not become too formal, and the time before and after the meeting must be devoted to informal discussion. It is most important that new members should be made to feel at home and given introductions to their fellow workers.

The growing claims of the Society upon the time of the members of your Council have resulted in their being deprived of much opportunity for discussion and meeting with their friends, and consideration is now being given to means for remedying this state of affairs.

During the year the Society has had to mourn the loss of four members. The sudden death of Frank Coote on 8th October last has deprived us of the company of a most regular attendant at our meetings and of one who had the welfare of the Society very much at heart. Joining in 1907, he was President in 1941, and was responsible for the programmes of our outdoor meetings. A full obituary notice will appear in our *Transactions* but I know that I am only voicing the feeling of us all when I say how much we miss the presence of one whose prevailing interest was in the welfare of the rising generation.

R. A. R. Priske, one of our older members, joined the Society in 1903 and was a frequent attendant at our meetings up to the time of the outbreak of war, when he moved down to Taunton. He served on the Council from 1910-2. He was a keen collector and an acute observer, devoting most of his attention to Coleoptera and Conchology, but seldom committed many notes to paper.

Herbert Page joined the Society in 1911, but rarely attended meetings of this, or of the Royal Entomological, Society. He was an active collector in his early days, later turning his attention to the European and exotic Rhopalocera, but rarely committing notes on his captures to paper. As a lifelong friend and helper of the late J. W. Tutt, he

was responsible for all the detailed work in connection with the founding and establishment of *The Entomologist's Record*. On Tutt's death in 1910, he was able to arrange for the continuation of the magazine, maintaining all business responsibility until 1926, when he passed on the work to others. Educated for the scholastic profession, he died early in March 1945, aged 76.

Dr H. D. Smart, a member of the Society since 1921, died in September last, aged 65. Serving in the R.A.M.C. during the Great War, he was awarded the Military Cross. In later years he had practised as an ophthalmic surgeon at Woodford in Essex, until moving to Bognor Regis in 1945. A keen field entomologist, he was a most sporting and generous companion, death coming upon him, net in hand, probably in the quest of *Colias hyale*. He had specialised in the continuous breeding of certain species, his best work perhaps being the continuation of *Angeronia prunaria* for seven generations, resulting in the elimination of the band on the brown form of the male insect. He had also concentrated on the breeding of *Arctia caia*, a melanic smoky form being one of his specialities.

Quite apart from the vicissitudes in our own affairs, the year 1945 will be forever memorable in the Entomological world. First, of course, came the conclusion of the war in Europe, bringing with it one of the four freedoms—freedom from fear—fear of the busybody who says, "What are you doing with that light?" shortly to be followed by the restoration of the basic petrol ration, thus allowing of earlier access to our collecting grounds.

Secondly, as if in honour of our world-wide victories, it has been perhaps the most remarkable year for migrant butterflies and moths on record. The number of species reported has been phenomenal, but pride of place must be accorded to the arrival of *Pontia duplidgei* in quantity, even accompanied by examples of *Everes argiades*. Has not the almost unbelievable good fortune of one of our members been recorded in a breath-taking article in the staid pages of *The Entomologist*, and even now, they tell me, the children of the Empire are whispering of his exploits!

This is not the place for details of all the captures made, but our meetings and the Annual Exhibition have been enriched by the numbers of rare migrants there displayed.

The outstanding event of the season is, perhaps, the addition to the British list of a noctuid moth, *Sedina buettneri*, taken by our member Dr K. G. Blair during the early autumn in the Isle of Wight. Most generously he has presented two specimens to our Cabinet, and the thanks of the Society are due to him for this valuable gift. It is too early yet to say whether the species is a chance visitor, or if it will be proved to be established like *Synia musculosa* in our corn-land or *Leucania l-album* on the coast.

It is a matter for some moment, too, that *Tinaca assectella*, known here for the past few years, appears to be spreading from the two origi-

nal colonies. It might well become a pest on leeks and onions, and reports from members in various parts of the country concerning its occurrence would be of value.

As recorded in the report of your Council, the Society is greatly indebted to many generous donors for their valuable gifts. To all of these our thanks are due, but in particular I must mention the name of Mr A. W. Dennis for the gift of his splendid microscope, lantern slides and many additions to our Library.

I must now pass to the customary second part of this address, and for the purpose I have prepared some remarks on:—

CAUSES FOR SEASONAL VARIATION IN THE NUMBERS OF LEPIDOPTERA,

with some thoughts on the disappearance of certain species and the
spread of others.

As the years go by, the task of selecting a subject for an address becomes one of increasing perplexity for your President, when it happens that he is not a specialist in any particular subject. After one or two false starts, and finding that particular subjects on which I felt I might speak had already been appropriated by previous occupants of this chair, I found that the broad question of seasonal variation in the numbers of Lepidoptera and the causes therefor had never been selected as a subject for the address, although, curiously enough, it formed the topic of the addresses delivered to the City of London Entomological and Natural History Society in 1902 and 1903 (12). The late Mr Robert Adkin referred briefly to the increase in numbers of certain species due to immigration, in his Presidential address to this Society in 1906 (21), having previously read a paper chiefly devoted to records of migration in 1890 (22). Other papers on the subject, by the same acute observer, were read in 1926 and 1929 (23). The subject has also been dealt with by Dr K. G. Blair in a paper entitled "Changes in the Insect Population during the last 100 years," which was read to the Society in 1937 (25), and by Mr S. G. Castle Russell in his paper in 1941 (13). The President of the Entomological Society of London, the late Mr F. Merrifield, also considered certain aspects of the problem in his Presidential address to that Society in January 1907 (24).

In dealing with the various questions which arise I have tried, therefore, to bring together questions of fact, in conjunction with the expressed opinions of known authorities, but in drawing conclusions it is necessary to bear in mind the wise words of that great naturalist, Gilbert White, written in 1769: "Ingenious men will readily advance plausible arguments to support whatever theory they shall chuse to maintain; then the misfortune is, everyone's hypothesis is each as good as another's, since they are all founded on conjecture" (1). How true that is!

I am sure that if heed were always paid to this maxim much error would be avoided, and false ideas would not be accepted as proven facts.

To come down to our subject then, it can be treated conveniently under four headings:—

- (a) Annual fluctuation in the numbers of widely distributed individual species.
- (b) The disappearance or great rarity of certain species once common.
- (c) The disappearance or reduction in number of certain common species.
- (d) The increase in population and spread of certain species once rare.

To deal first with (a) it is necessary to differentiate between species truly indigenous and those which depend for their maintenance on more or less frequent replenishment by immigration. As regards our native species, by far the greatest factor affecting their abundance is the weather, and, as I hope to show, one can summarise the matter by saying that good old-fashioned weather, with the seasons following their normal course, is that most generally favourable. Unfavourable factors are warm, damp winters, and wet, chilly and sunless summers. Great attention was devoted to this subject in the 60's and 70's of the last century when "mere collectors" were perhaps much more in evidence than they are to-day, and when they were provided with ready means of recording their observations in the pages of *The Intelligencer* and *The Weekly Entomologist*, later to be followed by the *E.M.M.* under the control of Mr Stainton; very useful summaries of the seasons' events are also to be found in *The Entomologist's Annual*, which however came to an end in 1874. To those interested, much valuable information is to be gathered in particular from *The Entomologist's Annuals* for 1859-64.

To follow the various causes, warm, damp winters have a singularly bad effect on all insects which pass the winter in the larval or pupal stages. In the case of the former, the larvae either wake too soon and find no food, or continue feeding only to be killed by the first severe spring frosts, or to fall a prey to birds owing to lack of the usual cover which should protect them had their growth been delayed till later in the season.

In the case of pupae, apart from the danger of mould or rot setting in, due to the water-logged state of the ground, the earth remains soft, and so their natural enemies—mice, moles and birds—can find them out and devour them.

We can then consider the case of those insects whose larvae feed in the spring and early summer. Here, the hard frosts sometimes encountered during May can play great havoc. The fearful frost of 1943 will be in everyone's memory, and it was common in that year to find the spring larvae hanging limp and lifeless on the blackened foliage which had been burned up entirely by the frost.

Another phenomenon which seems never to have been recorded until recent years are the winds laden with salt which have swept many parts

of the country. Such a wind occurred in 1938, and the salt mist deposited on the young foliage turned it brown and withered, and in my own experience I noticed the dearth of healthy larvae and the inevitable scarcity of imagines later in the season.

Having now discussed the effects of the weather in the early months of the year on the insect population to follow, it remains to consider that of the summer months. Here, we have definite proof that lack of sun with cold wet weather has a very bad effect. Insects may emerge about their usual time, but food is scarce and they hardly seem to have the heart for love-making, marriage and provision for the future of their race. Such summers are invariably followed by a scarcity of insects in the next year. To take an example, *Maculinea arion* (L.) seems to be an insect much affected by the weather at the time of emergence. Thus, it is stated that it was seldom seen at Barnwell Wold after the wet summer of 1860 (2).

In *The Entomologist's Monthly Magazine*, Vol. 21, there are three most interesting articles on the occurrence of this insect in the Cotswolds.

The general conclusion seems clear that fluctuation in numbers is due, principally, to cold wet summers, and that when the numbers have been reduced to the minimum by these causes, the insect stands in great danger of extermination at the hands, or rather the nets, of greedy collectors (3).

This danger of extermination was also emphasised in a paper read by Dr T. A. Chapman to the City of London Entomological and Natural History Society in 1909 (4).

Another important factor is the weather at the time when the ova are due to hatch. Cold and wet at this time may be very serious, and lead to a very high percentage of mortality (5). The insect, however, is notorious for changing its breeding ground, a necessity imposed upon it in many cases by changing conditions of vegetation (15).

On the other side of the picture we find that cold frosty winters, followed by genial weather in the spring and fine sunny weather (without prolonged drought or intense heat) usually produce an abundance of insect life.

After the scarcity of insects prevailing in the early 60's, we find Mr Stainton writing "the only hope lies in a hard winter followed by a hot summer and autumn" (6). This view is also supported by our member, Mr Mansbridge (7), whilst definite evidence to this effect is given by Mr Barrett in an article on the insects of the Pembroke coast (8). Here, in the years '75-'8, which had been wet, he had noticed a great dearth even of common insects. The winters of 1879 and 1880 were extremely cold, with very hard frosts, and the scarcity of previous years was replaced by plenty in 1880 and abundance in 1881.

In concluding my remarks under heading (a) it is necessary to mention those species which are recruited by or indeed depend upon immigration for a breeding stock. Assuming that the migrants arrive, it

is essential that the summer be warm and sunny in order that their larvae may feed up quickly and emerge. In this connection I have the genus *Colias* particularly in mind, and amongst the moths the immigrant Sphingidae, *Celerio livornica*, *galii*, etc., and *Macroglossum stellularum* (L.). If the summer be chilly and wet, their larvae will feed but slowly and the majority will perish miserably in the unaccustomed cold. Last season (1945) was a case in point. Both *croceus* and *hyale* were present, the latter widely spread, but *croceus* was never plentiful. Although two broods of *hyale* emerged, the lack of sun in August and September and the damp weather prevailing undoubtedly reduced the numbers that might have occurred had better weather been experienced.

To sum up therefore, as I said before, the conditions most favourable for an abundance of lepidoptera are a good old-fashioned winter, a late spring without May frosts, a sunny temperate summer, and a pleasant autumn.

We come now to the second item to be considered—the causes leading to the disappearance or great rarity of species once common in special localities or generally distributed.

Here we find that the species generally in question are the Diurni, such insects as *Aporia crataegi* (L.), *Nymphalis polychloros* (L.), *Lycaena dispar* (Haw.), *Cyaniris semiargus* (Rott.), *Leptidea sinapis* (L.), *Apatura iris* (L.), etc., though certain moths can be included such as *Lymantria dispar* (L.), *Laelia caenosa* (Hb.), *Caenophila subrosea* (Steph.), *Hadena dysodea* (Schiff.), etc.

We can perhaps lump the Fen species together and trace their disappearance to the draining and reclamation of their chosen homes, accompanied in certain cases by the burning of the sedge.

In the case of *Lycaena dispar*, over-collecting of course must have played its part, and there can be little doubt that this cause has also contributed greatly to the diminution and restricted range of *Apatura iris*, L., to-day. We read that 80 specimens were captured in a large wood near Kettering between 11th and 24th July 1857.

The greatest take was 20 on one day, the method employed being the well-known attraction of decaying flesh (14). It is only commonsense that no insect can stand such slaughter and hold its own. *L. caenosa* began to disappear but lingered on, and there is a record of a single specimen being taken at Cambridge some years after it had more or less disappeared from the fens. As regards *Lymantria dispar*, it is a great question whether it was ever really suited to be a resident in this country. An interesting paper was read on this subject to the City of London Entomological and Natural History Society in 1894 (16), the conclusion being that it is an imported species which may exist here for a time but which will always die out in the end.

Aporia crataegi is perhaps one of the most curious cases. In the last century this butterfly was widely distributed and abundant in such widely separated localities as S. Wales, the New Forest, Lewes and E.

Kent, but by the end of the century it had disappeared very rapidly from all but its Kentish habitat, where it lingered on for a few years (9).

It is difficult to suggest any definite cause for this phenomenon. It was persecuted certainly, but not, probably, to extinction. It has been suggested to me that it was never truly indigenous, and that our race was constantly replenished by the importation of fruit stocks from abroad. When these stocks were no longer brought in, their place being taken by home-raised stocks, this source of supply failed.

The spraying of orchards may, too, have had a deleterious effect on the insect, but it is also a hawthorn feeder, and was common up to 1875 in the New Forest enclosures.

Leptidea sinapis is perhaps a case in point of over-collecting. We are all rejoiced to see it gaining ground in its Surrey and Sussex localities, but it is such a gentle insect that it is very liable to be unduly persecuted by the avaricious collector.

At the end of the last century it was fairly common in the New Forest, but it has not been seen there for many years. Mr South tells the tragic tale of how he went to the Forest to take a few for a friend of his, and found a man with a net in its chosen locality. Mr South asked if he had seen any, when the collector replied that he had taken a number, in fact he said he had taken the last about half-an-hour ago in the next ride. "It was, indeed, the last," added Mr South, "for, from that day it was never seen again in the New Forest."

Whilst I am speaking of the Forest, too, it is interesting to recall the fate of that speciality the New Forest Burnet, *Zygaena meliloti* (Esp.). As is well known, its headquarters were at Wood Fidley near Stubby Copse, but it is no longer to be found there. In its day it had a great vogue, and it is told how a London dealer camped upon the spot and took every imago as it emerged. Finally, a fire destroyed all the undergrowth, so whether it was the dealer or the fire, poor *meliloti* no longer occurs in its chosen home, though it may be existent in one or two other more-or-less secret spots to which it had been transplanted in fear of some such catastrophe occurring.

Nymphalis polychloros (L.) is an insect of ups and downs, and its disappearance is probably to be associated with the attacks of parasites, to which it is particularly susceptible. Having been almost absent for some years, it seems to be gaining ground again at last and is reported from the Eastern Counties, E. Kent and the New Forest.

The abundance or disappearance of the food plant also plays an important part in insect population. For instance, bracken or gorse may spread and destroy or restrict the breeding ground, examples being bracken in the case of *Scopula immorata* (L.) near Lewes, which is now confined to a tiny area, and gorse in the case of *Maculinea arion* on the N.W. coast of Cornwall.

Another example is *Acosmetia caliginosa* (Hb.), feeding on the saw-wort, which is now never to be taken in the New Forest. The saw-wort,

once abundant, is now of rare occurrence, and the moth has disappeared with its food plant.

About *Hadena dysodea* (Schiff.) I can gain no information, but, in common with its allies it is very liable to attack by ichneumons and they may have proved too much for it, although this must be largely surmise.

Over-collecting is an ever present fear in the case of rare and local species. I have already referred to this in the case of *M. arion*, and in the later years of the last century eminent entomologists, even including Mr Stainton (10), were constantly declaring that this or that species would surely be exterminated. One such prophecy concerned *Adopea acteon*, Rott., but it seems as common as ever in its coastal haunts.

Enargia paleacea (Esper) was much persecuted at one time in the Sherwood Forest. I find that, in 1872, four collectors took over 1000 specimens and the writer sadly observes "It has never been so common since" (11).

An article on this subject by Dr T. A. Chapman has already been referred to, and the subject was also dealt with by the late Mr Bouskell in 1896 (17).

The general conclusion to be drawn is that when a scarce or local species has a good season the taking of specimens within reason has no deleterious effect, but when after several bad seasons even a few are collected the balance may be tipped and the species be too weakened to carry on the race.

To sum up, therefore, regarding the disappearance of certain species, we can say that altered conditions are the most important causes, whilst the attacks of enemies, both winged and human, also play their part.

Under item (c) I have only one or two species in mind, namely, *Euphydryas aurinia* (Rott.) and *Lysandra coridon* (Poda). In the case of the former, it is well known that it often moves about or sometimes entirely disappears from particular localities. In this connection two colonies spring to mind which are now no more, that near Eastry in E. Kent and another near Eastleigh in Hampshire. Both, I believe, were well persecuted, and as the insect is also very subject to parasitic attack it probably succumbed. On the other hand, the Hodd Hill locality still provides a flourishing colony, and I believe the "greasy field" near Carlisle is still well patronised by the insect, as it has been for 70 years or more.

How new colonies spring up I cannot pretend to explain, but only last year I found the butterfly exceedingly abundant over a wide area near my home, where it had never been observed from 1939 to 1943. I had not been to the spot in 1944. The only other insect I would treat under this head is *L. coridon*, which may suddenly suffer almost complete eclipse in a certain locality. This is certainly not due to over-collecting or to parasites, but may be due to disease. Mr Leeds, writing in *The Entomologist's Record* in 1942 (18), states that the appearance of ab. *metallica* is a sure sign of disease and eventual extermination of the colony, and everyone will immediately think of the colony

at Royston, which was such a happy hunting ground for so many over a number of years. In the end, however, Mr Leeds' forecast proved correct and, although the colony is now once again very strong, the variety hunter will find little to gratify him on the Heath, although vars. *roystonensis*, Pickett, and *inaequalis* (Tutt.) have been taken again recently. The cases quoted by Mr Leeds seem too frequent to rank as mere coincidences, but it might be fairer to say that the appearance of increasing numbers of varieties in a colony, including ab. *metallica*, is an indication of degeneracy and disease, which will lead to the eventual extermination of the colony and from which recovery may be a matter of some years (19).

I come now to the most pleasing of my sub-heads, that dealing with the increased distribution of certain species and their greater abundance. The most striking example, of course, is *Polygonia c-album* (L.), which, after being a comparative rarity outside certain Western localities, is now widespread and abundant over the S. of England and seems still to be extending its range. Other examples are *Limenitis camilla* (L.), *Pararge aegeria* (L.) and *Leptidea sinapis* (L.), which may be included here as well as in section (b) already dealt with, whilst amongst the Heterocera, *Hyloicus pinastri* (L.) is spreading fast from its Dorset home, and is now breeding freely as far east as Eastleigh in Hampshire. The spread of the Comma butterfly seems to have commenced about 1921, and by 1931-2 it was well past Hampshire and spreading north. The increase of *Pararge aegeria* in Hampshire is a more recent phenomenon, and as far as my observations go is still in progress. I cannot associate any of these cases with changing climatic conditions, good or bad seasons, immunity from ichneumons or other causes, nor can I find any explanations offered in recent literature.

In the *Transactions of the Society for British Entomology* (20), an interesting paper by the late Engineer-Commander J. J. Walker deals with the history of this butterfly in Great Britain since the early years of the 19th century, and contains a detailed account of its remarkable spread across England during the past 20 years. Even so experienced an entomologist as Commander Walker finds himself unable to draw any general conclusion from the reports collected, but as regards Oxford in 1921, he writes that he "thought the increase arose from a series of local conditions favourable for the life of the insect in its earlier stages," as it had occurred occasionally, though rarely, in the district for many years previous to its common occurrence in 1921.

I feel, therefore, that in accordance with the maxim I have quoted of Gilbert White, I must not attempt to draw up any explanation, but must leave the reasons for further investigation and discussion.

This brings me to the end of my subject, and I fear that whilst having been able to bring together a certain amount of data, much scope is left for argument and research. In particular, the reasons for the increase in numbers of certain species are remarkably obscure.

Changes in climate are very gradual in this country, and whilst we may have cycles of warm or cold winters, I cannot believe that the spread of *Polygonia c-album* over so much of the country can be attributed to such causes. The subject is a fascinating one and I can only hope that one more capable than I may be able to accumulate data and by careful analysis provide us with a satisfying explanation of this pleasing phenomenon.

Ladies and gentlemen—I must ask your forbearance for the length of this discourse, but before concluding I want to express the deep debt of gratitude I owe to the permanent officers of the Society. I am deeply grateful to you for the honour you paid me in extending my term of office as your President for another year, a task made easy and doubly pleasant by the help I know that I shall receive.

I can never be sufficiently thankful to Mr Stanley-Smith for all his work as Honorary Secretary; he is indeed a tower of strength to the Society. Mr Hawkins, who nobly volunteered to undertake the duties of Minuting Secretary during the war, has now expressed his wish to retire, and I take this opportunity of expressing my thanks for all his help, upon which we shall still be able to rely at meetings of your Council.

Mr Eagles, at short notice, relinquished the office of Treasurer to take over the duties of Editor—an office for which he is so well qualified by his extensive knowledge of the various Orders—and we were most fortunate in being able to persuade Mr Henderson to take over the very important task of looking after our finances.

In addition to his duties as Hon. Librarian, Mr Syms has the heavy task of arranging for the programmes of indoor meetings, whilst the late Mr Coote, whom I have already mentioned, had the task of organising those for the field meetings. Our Curator, Mr Coulson, has no mean task in re-arranging and caring for our collections.

Finally, I must express very great regret that our Hon. Lanternist, Mr J. H. Adkin, has been compelled by ill-health to relinquish this duty, and couple with very grateful thanks to him for his services my best wishes for his speedy recovery.

To all our honorary officers, therefore, may I express my gratitude for their help and my admiration for the work they carry out so ably on our behalf, and on which depends the progress and welfare of this old Society.

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FIELD MEETINGS, 1945.

EFFINGHAM and WISLEY—31st March 1945.

Leader, Mr T. R. EAGLES.

Nine members attended.

The weather was good. Much time was spent probing the bark of poplars for the pupae of *Sesia apiformis*, Cl. Many old pupae were found and one or two living ones. The chiff-chaff was heard. Chaffinches were seen to have almost finished building. Some Douglas Fir (*Pseudotsuga taxifolia*, Britt.) by the roadside was observed to be heavily attacked by *Chermes cooleyi*, Börner. The sloe bushes were in full bloom.

ASHTED—15th April 1945.

Leader, Mr W. J. FINNIGAN.

The first visit of the season was made in fine weather, and 14 members and visitors attended.

Many butterflies were noted, but the only species in any numbers was *Pararge aegeria* (L.). Others seen were *Euchloë cardamines* (L.), *Gonepteryx rhamni* (L.), *Nymphalis io* (L.), and *Syrichthus malvae* (L.).

Young larvae of *Limenitis camilla*, L., were found by some of the party.

The heterocera taken or recorded included *Apatele rumicis* (L.), *Phragmatobia fuliginosa* (L.), *Caenoteophria derivata*, Schiff. (*nigro-fasciaria*, Goeze), *Bapta distinctata*, H.-S. (*pictaria*, Curt.), *Eupithecia abbreviata*, Steph., *E. oblongata*, Thunb., *Drepana falcataria*, L., *Ectropis punctulata*, Schiff., *Graptolitha ornithopus*, Hufn.

In addition, larvae of *Philudoria potatoria*, L., *Hygrochroa syringaria*, L., and *Campaea margaritata*, L., were collected.

Among the birds the grasshopper warbler, tree pipit, cuckoo and whitethroat were observed by the ornithologists.

OXSHOT—29th April 1945.

Leader, Mr S. WAKELY.

The weather was very unsettled, and snow was still lying in patches near the station when the party arrived. However, it was not really cold, and a few nice things were taken. The earliness of the season was demonstrated by a fine specimen of *Boarmia punctinalis*, Scop. (*consortaria*, Fabr.), seen on a tree-trunk. *Cosymbia pendularia*, Clerck, was fairly common, and had evidently been out some time. A fine larva of *Hipparchus papilionaria*, L., was spotted on a small birch tree. Two fine specimens of *Borkhausenia tinctella*, Hübn., were subsequently bred

from fungus taken; and from some rags lying in the undergrowth a number of larvae of *Monopis ferruginella*, Hübn., were collected. On the dead birches the black fungus, *Daldinia concentrica*, Ces. & de Nat., yielded larvae of *Myelois neophanes*, Durrant, a fine local species.

A Willow Tit was found sitting on its nest on splitting open a dead birch stump, while searching for fungus-feeding larvae. The bird did not leave the nest, and the pieces of wood were forced back into their original position.

Among the beetles taken were examples of *Dorcus parallelepipedus*, L., and *Rhagium bifasciatum*, F., together with numerous other species.

ASHTED—13th May 1945.

Leader, Mr W. J. FINNIGAN.

Six members only made up the party on this occasion although the weather was fine and conditions seemed quite suitable for field work.

Vanessa cardui, L., was taken soon after leaving the station.

Lycaena phlaeas, L., and *Polyommatus icarus*, Rott., were later observed and a few larvae of *Thecla quercus*, L., were beaten from the oaks.

Other insects noted were *Euclidia mi*, Clerck, *E. glyphica*, L., *Phytometra viridaria*, Clerck, *Ematurga atomaria*, L., and *Pheosia tremula*, Clerck.

Larval nests of *Orthosia miniosa*, Schiff., were quite common and a small caterpillar of *Notodonta dromedarius*, L., was found on birch as well as one or two ova of this species.

The following micro-lepidoptera were taken:—Imagines: *Pammene germana*, Hb., *Bucculatrix boyerella*, Dup. Larvae: *Phycita spissicella*, F., *Eupista albidella*, Herr.-Schäff., *Elachista albifrontella*, Hb.

HOLMWOOD—26th May 1945.

Leader, Mr G. A. ENSOR.

Five members braved the almost continuous showers of rain and made a brief trip into Redlands Wood in the morning. In the afternoon a visit was paid to Holmwood Common, and tea was taken at the Holly and Laurel P.H.

A keeper's larder of grey squirrels yielded the following Coleoptera—*Dermestes murinus*, L., *Saprinus semistriatus*, Scriba, and *Necrobia violacea*, L.

Plant Galls found in Redlands Wood were:—On *Fraxinus excelsior*, L.: *Psyllopsis fraxini*, L. (Psyllidae). On *Quercus robur*, L.: *Andricus inflator*, Hart., *A. curvator*, Hart., *Biorhiza pallida*, Oliv. (Cynipidae). On *Alnus rotundifolia*, Mill.: *Eriophyes laevis*, Nal. (Eriophyidae). On *Fagus sylvatica*, L.: *Hartigiola annulipes*, Hart. (Cecidomyiidae). On *Sorbus aucuparia*, L.: *Eriophyes pyri*, Pag. (Eriophyidae). On *Crataegus monogyna*, Jacq.: *Eriophyes crataegi*, Can. (Eriophyidae).

On *Populus nigra*, L.: *Taphrinia aurea*, Fries. (Fungus). On *Ulmus campestris*, L.: *Schizoneura ulmi*, L. (Aphidae). And on Holmwood Common:—On *Fraxinus excelsior*, L.: *Dasyneura fraxini*, Kieff. (Cecidomyiidae). On *Quercus robur*, L.: *Biorhiza pallida*, Oliv., *Neuroterus baccarum*, L., *Andricus curvator*, Hart., and *A. seminationis*, Gir. (Cynipidae). On *Populus tremula*, L.: *Harmandia globuli*, Rueb., *Lasioptera populnea*, Wach., *Syndiplosis petioli*, Kieff. (Cecidomyiidae). Also *Taphrinia aurea*, Fries. (Fungus).

Coleoptera:—*Phyllodecta laticollis*, Suffr., *Dorytomus tortrix*, L., *D. dejeani*, Faust, and *Chalcoides aurea*, Geoff., occurred on the aspens.

Cryptoblabes bistriga, Haw., a local micro-lepidopteron, was taken, also the larva of the *Polyplocia ridens*, F.

ASHTHEAD—10th June 1945.

Leader, Mr S. WAKELY.

In spite of wet weather some local micros were taken on tree-trunks, namely:—

Imagines—*Telphusa scalella*, Scop., *T. luculella*, Hb., *T. fugitivella*, Zell., *Schiffermuelleria tripuncta*, Haw., *Argyresthia glaucinella*, Zell.

Larvae—*Polychrosis fuligana*, Haw. (fairly common, feeding on pith of centre shoot at top of stem of *Cirsium arvense*, Scop.), *Depressaria alstroemeriana*, Clerck, *Acrocercops brongniardella*, F.

BYFLEET—23rd June 1945.

Leader, Mr F. D. COOTE, F.R.E.S.

Imagines taken included *Diacrisia russula*, L., *Crambus uliginosellus*, Zell. (common, but very local in patches on bog-land).

Pupae of *Aegeria vespiformis*, L., were taken from oak stumps where trees had been felled.

(The main part of the report was lost owing to the death of Mr Coote.)

ASHTHEAD—30th June 1945.

Leader, Mr F. D. COOTE, F.R.E.S.

Imagines taken on tree-trunks:—*Eucosma brunnichiana*, L. (this species was separated from *E. solandriana*, L., in 1935. Several specimens taken on birch trunks); *Recurvaria leucatella*, Clerck; *Blastodacna stephensi*, Staint. (apparently a new locality for this very local species); *Tischeria complanella*, Hb.

Larvae—*Vanessa cardui*, L., on *Cirsium lanceolatum* (L.); *Polychrosis fuligana*, Haw.

Pupae of *Orthotaelia sparganella*, Thnbg., were common in stems of Bur reed (*Sparganium*).

Diptera—Chameleon Fly (*Stratiomys potamida*, Mg.).

TILGATE—Sunday, 22nd July 1945.

Leader, Mr S. WAKELY.

The weather remained fine for this meeting. A few larvae of *Vanessa atalanta*, L., were taken on nettles on the way to Tilgate Forest. Several fine larvae of *Smerinthus ocellatus*, L., were taken on sallow; while aspens produced larvae of *Cerura vinula*, L., and *Tethea or*, F. *Argynnis paphia*, L., and *A. cydippe*, L. (*adippe*, L.) were still on the wing, but in poor condition. Two local micros were taken, namely, *Opostega crepusculella*, Zell. (beaten from sallows) and *Peronea fissurana*, Pierce (larvae in spun sallow tips).

Several interesting plants were seen in flower, among which might be mentioned *Wahlenbergia hederacea*, Sch. (Ivy-leaved Bell-flower), *Anagallis tenella*, Murr. (Bog Pimpernel), and *Scutellaria minor*, Huds. (Small Skull-cap).

Two dragonflies were taken: *Aeshna grandis*, L., and *Sympetrum striolatum*, Charp.

Two vipers of a peculiar tawny colour were seen, one of which was dispatched.

 ASHTEAD—5th August 1945.

Leader, Mr F. D. COOTE, F.R.E.S.

Larvae taken included:—*Bedellia somnulentella*, Zell., on *Convolvulus*; *Ancylis lactana*, Fabr., on *Aspens*.

(Main records lost owing to the death of Mr Coote.)

 BOXHILL—18th August 1945.

Leader, Mr S. WAKELY.

This meeting proved very popular, with attendance well up to average. Larvae of *Pterophorus carphodactylus*, Hüb., were found in flowers of *Inula conyza*, wherever searched for, and they were also to be found in crowns of younger plants. This species is increasing in a remarkable manner. A few *Eumenis semele*, L., and *Hesperia comma*, L., were taken. *Aspitates gilvaria*, Fabr., was really common, but the females, as usual, were scarce. Flying among the common *Pyrausta nigrata*, Scop., were a few specimens of the local *P. cingulata*, L. A fine specimen of the rare *Loxostege sticticalis*, L., was netted, a noteworthy capture. Odd specimens of *Gnophos obscurata*, Schiff., were also netted.

Larvae of *Peronea boscana*, Fabr., were common on low roadside elms in Headley Lane and near Burford Bridge. The leader has only met with this as occasional odd specimens in previous years in this locality. Other species noted were *Melanthia procellata* (Schiff.) and larvae of *Cilix glaucata*, Scop.

The following coleoptera were noted:—*Lampyrus noctiluca*, L. (larva seen), *Onthophagus ovatus*, L., *Scaphosoma agaricinum*, L., *Cryptcephalus hypochaeridis*, L., *Platycis minutus*, F. (on Canon Edwards's

car!), *Phytonomus (Hypera) plantaginis*, Deg., the last in the fields below Ranmore after tea.

BOOKHAM—16th September 1945.

Leader, Mr W. J. FINNIGAN.

The unsettled weather was probably responsible for keeping many members from attending, but the party of five who made the journey were treated to a fine sunny day.

Lepidoptera seen were few although in one area *Plusia gamma*, L., was quite common and several *Nomophila noctuella*, Schiff., were observed.

It was interesting also to note fresh specimens of *Polygonia c-album*, L., as this butterfly was not very conspicuous in some parts of Surrey during the earlier part of the season.

Larvae of the following species were collected:—*Cerura furcula*, Clrck., *Notodonta dromedarius*, L., *N. camolina*, L., *N. ziczac*, L., *Pygaera curtula*, L., *Drepana lacertinaria*, L., and *D. falcatoria*, L.

On the botanical side some fine plants of the Nodding bur-marigold (*Bidens cernua*, L.) and the Trifid bur-marigold (*Bidens tripartita*, L.) were in flower.

The fungi were quite well represented, and members recorded:—*Lepiota procera*, Quel., *Russula emetica*, Fr., *R. ochroleuca*, Fr., *Nyctalis asterophora*, Fr., on decaying specimens of *R. nigricans*, Fr., *Lactarius vellereus*, Fr., *Collybia clavipes*, Pers., *Laccaria laccata*, Quel., *Entoloma clypeatum*, Quel., *Boletus chrysenteron*, With., *Trametes rubescens*, Fr., *Cantherellus cibarius*, Fr., *Scleroderma vulgare*, Hornem., *Schizophyllum commune*, Fr.

The party dispersed at five o'clock, having decided not to walk on to Effingham for tea.

ASHTHEAD—30th September 1945.

Leader, Mr W. J. FINNIGAN.

Once again a fine day was enjoyed by the eight members who attended this outing.

Some time was spent near the station searching for larvae of *Perizoma bifasciata*, Haw., and *Coleophora paripenella*, Zell., of which a number were taken.

Subsequent searching and beating produced a full-grown larva of *Calocasia coryli*, L., at rest on a hazel leaf, and larvae of *Drepana lacertinaria*, L., *Pheosia gnoma*, Fab. (*dictaeoides*, Brahm.), *Cosymbia pendularia*, Clérck, *Iodis lactearia*, L., *Ceramica pisi*, L., and *Rararge aegeria*, L.

Imagines of *Peronea cristana*, Schiff., and *Peronea fissurana*, Pier. & Met., were secured.

Several of the members who turned their attention to the fungi were well rewarded, and the following species were recorded:—*Amanita*

muscaria, Pers., *Am. mappa*, Quel., *Amanitopsis fulva*, W. G. Sm., *Lepiota carcharias*, Karst., *Lep. mesomorpha*, Fr., *Tricholoma flavobrunneum*, Quel., *Mycena galopus*, Pers., *My. alcalina*, Fr., *My. pura*, Quel., *Collybia dryophila*, Quel., *Clitocybe flaccida*, Quel., *Lactarius turpis*, Fr., *L. pyrogalus*, Fr., *L. vietus*, Fr., *Hygrophorus virgineus*, Fr., *Pluteus cervinus*, Quel., *Nolanea rufocarnea*, Berk., *Stropharia inuncta*, Quel., *Hypholoma appendiculatum*, Quel., *Panaeolus papilionaceus*, Quel., *Psilocybe helvola*, Schaeff., *P. semilanceolata*, Fr., *Coprinus fimetarius*, Fr., *Cop. plicatilis*, Fr., *Cop. atramentarius*, Fr., *Boletus chrysenteron*, With., *Clavaria cristata*, Pers., *Cl. fusiformis*, Sow., and *Otidea aurantia*, Oed.

OXSHOTT—14th October 1945 (Fungus Foray).

Leader, Mr W. J. FINNIGAN.

Only four members made up the party for this outing, and although the weather was rather dull during the morning with a certain amount of mist, this cleared after lunch and warm sunshine was enjoyed during the afternoon.

The meeting was arranged primarily for the study of fungi, but, owing to the prevailing dry weather, species were not so numerous as they might have been.

On the whole, however, it was an interesting day, and special mention may be made of one or two finds. The orange peel fungus, *Otidea aurantia*, Oed., was seen to advantage, and one particularly fine group was growing in a small pit in the sandy soil.

The pine woods yielded *Sparassis crispa*, Fr., *Hydnum melaleucum*, Fr., *H. ferrugineum*, Fr., *Thelephora laciniata*, Pers., and the mycetozoon, *Stemonitis fusca* (Roth.).

The remaining species were as follows:—*Amanita mappa*, Quel., *A. rubescens*, Pers., *Amanitopsis fulva*, W. G. Sm., *A. vaginata*, Roze, *Tricholoma nudum*, Quel., *Russula ochroleuca*, Fr., *R. furcata*, Fr., *Lactarius pyrogalus*, Fr., *L. torminosus*, Fr., *L. quietus*, Fr., *L. rufus*, Fr., *Lenzites betulina*, Fr., *Pascillus involutus*, Fr., *Cortinarius malicorius*, Fr., *Hypholoma sublateralitium*, Quel., *Psathyra semivestita*, B. & Br., *Coprinus comatus*, Fr., *Boletus radicans*, Fr., *Polyporus amorphus*, Fr., *P. schweinitzii*, Fr., *Polystictus perennis*, Fr., *Trametes rubescens*, Fr., *Clavaria cinerea*, Pers., *C. argillacea*, Pers., *Scleroderma vulgare*, Hornem.

Apart from the fungi, a specimen of the yellow form of the larva of *Apatele leporina* (L.) was taken as well as a full-grown larva of the birch sawfly, *Cimbex femorata* (L.).

The November moth (*Oporinia dilutata*, Schiff.) was beginning to appear, several being seen during the day.

Tea was taken at the Hut Tea Room by the Station about 5 o'clock as arranged.

TRANSACTIONS.

SOME EXTERNAL ASPECTS OF THE BODIES OF DIPTERA.

By H. W. ANDREWS, F.R.E.S.

Read 10th February 1945.

I do not think I should be far out in saying that to the ordinary man-in-the-street, possibly even to some entomologists, the prevalent idea of Diptera is that of drab insects with plain wings and annoying habits, differing to a certain extent in size and shape but otherwise all much of a muchness so to speak. As a matter of fact, as can be proved by examination of any representative collection, there are great differences within the Order not only in shape and size but also in colouration and vestiture; and it is on these varying aspects that I propose to make some general remarks as regards our British species.

SHAPE.

I do not propose to deal with anatomical details beyond pointing out that the main characteristic of the thorax in Diptera is the fusion of the main divisions and the predominance of the mesonotum. The prothorax and metanotum are much reduced, and the latter often concealed by the scutellum, a small semicircular extension of the mesonotum simple in shape, though in one small family (Berinae) it has a series of blunt spine-like projections round its rim. The thorax is generally of an elongate oval shape and flattened on the upper surface, but it is sometimes distinctly humped, e.g., in some Empididae and in the family Cyrtidae. The separate sclerites forming the enlarged mesonotum are more or less distinct in the Nematocera which is regarded as the most primitive of the three sub-orders—Nematocera, Brachycera, and Proboscidea. They are much less clearly defined in the two latter, and in the most highly developed families, e.g., Anthomyiidae and Tachinidae, the only indication left is a transverse depression known as the thoracic suture. In the pleurae, on the other hand, the sclerites are well defined in all three sub-orders.

The abdomen consists of a varying number of segments. There may be as many as nine (in some Tipulidae) and as few as five. In the rare Syrphid, *Triglyphus primus*, Lw., there are only two obvious segments. The segments vary in width in different species. In Tachinidae the apparent first segment—the actual first being concealed—has a semicircular depression which lies beneath the apex of the scutellum and which is used as a diagnostic factor according to whether it extends right across the segment or not. In some Conopidae (*Siccus*) and also in some Tachinidae and Acalypteratae the terminal segments are curved beneath the abdomen in both sexes. The terminal abdominal segments

are often much modified in shape and form the "hypopygium" which bears the genitalia. In the majority of cases the genitalia are wholly or partially concealed, but in others they are plainly visible. In the males of Dolichopodidae they are visible and incurved beneath the abdomen: in Empididae and Asilidae they are visible but not incurved. In females the extrusible ovipositor is normally concealed but fully visible in certain families. In some Pipunculidae and in the Horse bot-fly (*Gastrophilus equi*, F.) it is incurved beneath the abdomen. In Trypetidae it is straight and in some species is as long as or longer than the rest of the abdomen. It often has terminal lamellae, and in some instances a terminal circlet of spines used in preparing a receptacle for the eggs. To deal with the intricacies of the genitalia would need a separate paper which I am not qualified to write. I would only remark here that as in other Orders an ever increasing use is made of them for diagnostic purposes, and that so far as the Diptera are concerned, each successive writer on the subject seems to use a different terminology for the various parts.

There are three main types of body-shape:—(I) The long thin body with numerous segments characteristic of the majority of the Nematocera (e.g., Daddies and Gnats) but also to be found scattered among the other sub-orders, e.g., *Leptogaster* (Brachycera, Asilidae) and *Sphaerophoria scripta*, L. (Proboscidea, Syrphidae); (II) an intermediate type with a rather long but not necessarily thin body to be found in Brachycera and Proboscidea; and (III) the oval "house-fly" type of body with fewer abdominal segments than groups (I) and (II), characteristic of the bulk of British flies but not often occurring in Nematocera. These three main types shade off into each other and no hard and fast line can be drawn as to where one ends and another begins, yet individual specimens of all three are easily recognisable. The third group is the most variable in shape, including the almost square bodies of certain Stratiomyid flies; the globular bodies of Cyrtidae and some Bombyliidae; and the flattened bodies of the Hippoboscidae. Apart from these three main types a few genera and species have pedunculate abdomens. *Baccha* and *Doros* in Syrphidae: *Physocephala* and some species of *Conops* in Conopidae. These usually resemble Hymenoptera both in shape and coloration.

COLORATION.

Although in the majority of British flies the thorax and abdomen are dull coloured there are many exceptions and even in the dull coloured species the various shades of brown and grey are often relieved by subdued patterns in the shape of stripes and/or spots on both thorax and abdomen, and dark rims to the margins of abdominal segments. In many species the whole body may be black or yellow, less often green. It may be polished and shining or dull and matt.

Cases of metallic coloration, often indicated by the presence of the Latinised form of the Greek root-word $\chi\rho\omicron\sigma$ (= gold) in the generic

name, occur throughout the Brachycera and Proboscidea, but not, so far as I am aware, in the Nematocera. In the sub-family Sarginae (Stratiomyidae) all the genera are metallic coloured, and one species, *Chrysonotus bipunctatus*, Scop., might well be mistaken for a member of the Hymenopterous family Chrysidae (Ruby-flies). About 80% of the Dolichopodidae are of a greenish metallic colour: in Syrphidae examples occur in the genera *Chrysogaster*, *Chrysochlamys*, *Calliprobola* and *Callicera*. In the Muscidae (*Sensu lato*) *Gymnochaeta viridis*, Fln., is a striking example of metallic green colour. It may be seen on tree-trunks in May and early June, gleaming in the sunlight like a living emerald. The deep blue shining abdomen of *Cynomyia mortuorum*, L., another Muscid, is an equally fine example of that colour. In the Muscidae, too, there are the green-bottles and blue-bottles, perhaps the best known of all metallic coloured flies. The bronze coloured specimens that occur among the normally green coloured bottle flies, owe their particular hue, I understand, to age rather than to a distinctive coloration. I think this has been proved by experiment but cannot now trace the reference. In the large group of the Acalypterates various species are more or less metallic coloured (e.g., the genus *Lonchaea*), but in this group the predominant shining species tend to black or yellow rather than to metallic coloration.

Apart from these metallic coloured species the main colour schemes in our British Diptera are combinations of black and yellow, black and red, black and white, and black and green, in that order. The Syrphidae, with some few exceptions, are, par excellence, the most vividly coloured family, and everybody knows the black and yellow-barred Hover-flies (*Syrphus*). All four of the above colour combinations are to be found in Syrphidae. The family Stratiomyidae is a close second to the Syrphidae in varying colour schemes and the species *Oxycera trilineata*, F., and *Odontomyia viridula*, F., both of this family, afford striking examples of black and green coloration though their vivid colouring is sadly apt to fade after death.

Apart from the Syrphidae and Stratiomyidae examples of the colour combinations referred to above occur throughout the other families of Diptera but not nearly to the same extent. Black and yellow in the shape of stripes and spots occurs in the Nematocera, as do whole-coloured yellow and green species. Many of the Acalypterates are handsomely coloured, but their generally smaller size and ground-frequenting habits render them much less conspicuous than the larger Syrphids and Stratiomyids. I do not know this group very well but generally speaking I should say that black, brown and varying shades of yellow are the predominant colours.

Another type of coloration, or perhaps one should rather say pattern, is the tessellated appearance characteristic of the Sarcophaginae (Flesh-flies) and some other Muscids. This tessellation, shifting according to the angle of vision, is presumably due to differences of striation in the hairs clothing the body. I cannot speak definitely on this subject

and suggest it as an interesting subject for microscopic investigation. The climax of this type of coloration or pattern is to be found in such species as those of certain Dolichopodid genera, e.g., *Diaphorus* and *Argyra*, where the entire male abdomen has a shining silvery appearance in certain lights, glinting and disappearing when the insects are in flight according as the light is reflected from their bodies or not. The same silvery appearance of the abdomen occurs in the males of the Stratiomyid fly *Odontomyia argentata*, F. I have never met with this species alive myself, but Lundbeck (quoted by Verrall) refers to the males sitting in numbers on dead rushes looking like silver spots, while the females were on the flowers of *Salix*. *O. argentata* is an early (May) species and frequents marshy localities. Similar examples of this silvery coloration occur in the sand-dune species, *Thereva annulata*, F. (Brachycera, Therevidae), and *Pipunculus littoralis*, Becker (Proboscidae, Pipunculidae), where the male abdomen is silvery. In this latter case it is the thorax and scutellum rather than the abdomen that is of silvery appearance. Silvery streaks, the " shimmer-stripes " of Verrall, also occur on the pleurae of most of the males of the genus *Dioctria* (Brachycera, Asilidae).

In a certain number of species, not confined to any one group, there is a tendency towards a lighter coloured zone at the base of the abdomen indicated by side patches, white or red in colour, and varying considerably both in extent and intensity. In extreme cases of this kind, e.g., in the Syrphids, *Volucella pellucens*, L., and *Leucozona lucorum*, L., this is correlated with a dark median patch on the wings resulting in a break-up of the outline of the insects, when at rest, into two unequal dark portions separated by a light-coloured belt or band. This may be of protective value, but if so it might be expected that such light-coloured patches would be more extensive than they are in many cases where they are but slightly noticeable, and also that they should occur in a larger proportion of species than they actually do.

SEXUAL DIMORPHISM.

Sexual dimorphism occurs but little in Diptera, and when it does occur seems confined to pattern or colour rather than to size or shape. In certain species of the genus *Bibio* (Nematocera) the bodies are black in the males and red in the females. Several of the Platypezidae (Proboscidea) have black or dull coloured bodies in the males whilst in the females they are strongly patterned in grey and black. There is also a certain amount of sexual dimorphism in the Stratiomyid genus *Nemotelus*. The Syrphid genera, *Platychirus*, *Melanostoma*, and *Melangyna*, show a strong tendency to melanism in the females, and this is also the case in the common black and white Syrphid, *Catabomba pycnasteri*, L., which has a melanic form of the female—rare in this country—called var. *unicolor*, Curt. As a general rule, however, the males and females of our British Diptera are alike in shape, colour, and vestiture.

VESTITURE.

So far as body-covering is concerned there is a wide range from species with quite bare bodies, dull or polished, through varying degrees of pilosity to those whose bodies are covered with dense pubescence. As in shape and colour, these differences range throughout the three sub-orders, though I do not know of any pubescent species in the Nematocera, which are mostly bare or only thinly pilose. Scales as a body covering are almost non-existent, their place being taken by hairs. Exceptions to this occur in the family Psychodidae or Owl-flies (Nematocera), where both thorax and abdomen are covered with scales, and also in some of the Culicidae. The only other case I can call to mind is that of the Bombyliid genus *Anthrax* (Brachycera), where the abdomen has bands of scales. Otherwise scales, where they do occur, are mostly confined to the legs or wings and so do not come within the scope of this paper.

A large proportion of species have an armature of bristles as opposed to hairs or pubescence. These may occur in bare, pilose, or pubescent species, though not often in the last, and their arrangement or pattern on thorax and abdomen (and legs) is remarkably constant. This constancy of arrangement gives them an advantage over the more variable factor of colour as a diagnostic character, nor is dissection necessary, as is often the case when dealing with genitalia. It is not surprising, therefore, that great use is made of chaetotaxy, as it is termed, for diagnostic purposes. The study of chaetotaxy is of comparatively recent date. It originated in a paper by Baron Osten Sacken in the *Trans. Ent. Soc.* for 1884, and has been further developed in this country by Grimshaw (*E.M.M.*, 1895), and on the Continent by Girschner.

Pubescent species occur mainly in the Syrphidae but are also found in other families, e.g., Bombyliidae, Asilidae, Tachinidae, Scatophaginae, and Oestridae. Some of the larger Syrphids with pubescent body-covering are amongst the most handsome of our British Diptera and often remarkable for the amount of their colour variation even within the limit of a single species; e.g., *Merodon equestris*, F. (The Narcissus Fly), which has five or six named forms. Among the pubescent Syrphidae, too, occur some of the best known cases of so-called mimicry: species of the genera *Eristalis* (Bee-flies), *Mallota*, *Pocota*, *Merodon*, and *Criorrhina*, for instance, all resembling honey bees and Humblebees. The various species of the genus *Chrysotoxum* (non-pubescent) resemble wasps, and the rare *Doros conopseus*, F., with its pedunculate abdomen and darkened costal wing-margins, resembles both the distinct Dipterous family *Conopidae* and the Hymenopterous genus *Crabro*. Verrall states of this fly, "I wondered why this species and *Physocephala nigra*, Deg. (*Conopidae*) apparently mimicked each other until I realised that both *Doros* and *Conops* independently mimicked a *Crabro*." Personally, I consider the above examples more as coincidences rather than definite cases of mimicry and would repeat what I said in a previous

paper on Wing-markings in Diptera, viz., that until we get a good deal more definite evidence on this point the verdict should be the Scotch one of "not proven."

Finally, I fear I can draw no special conclusions from the foregoing remarks except the negative one that the considerable amount of variation that occurs in shape, colour, and vestiture, in our British Diptera is not confined to any one group or family, nor does it fit into the taxonomic classification of the Order, being of little or no value in that respect, but I hope that what has been said may help to dispel the idea that the British Diptera consist of "drab insects with plain wings, all much of a muchness," and possibly may tend to a greater interest being taken in what is still to a great extent one of the "neglected" Orders.

Note.—The original reading of this paper was accompanied by a number of exhibits illustrative of various points.

NATURE RAMBLES WITH A CAMERA.

By W. H. SPREADBURY.

Read 10th March 1945.

It is some years since I first took a camera with me on my rambles and paid for my experience with many wasted plates, but, having previously hired slides from time to time to illustrate lectures, and having been more than once disappointed in the material sent me, I decided to make my own slides. Since then I have rarely rambled without a camera of sorts; and as nature photography demands the use of a stand, that, too, has to be carried around—a considerable addition to the already weighty apparatus of the field naturalist.

My talk, then, is in part an attempt to justify undertaking the extra burden, for none of us, however enthusiastic, cares to carry around apparatus uselessly. And here let me remark on one unexpected advantage the burden of the photographic apparatus brought. It frequently led to a smaller distance being covered and a more thorough searching of a limited area with results that were often very gratifying.

I think all will agree that photography can illustrate a good deal that the collection cannot, and can often show better what the collection can portray only badly, or at best with an artificiality that fails to convince. Indeed, some nature-lovers, in their enthusiasm for protecting and sparing wild life, have advocated photography as a substitute for collecting—a very sweeping claim. Collecting, with an end in view, and as an aid to the study of certain branches of natural history has its place, but even here photography can be a valuable aid to our studies. The two can be usefully complementary.

Having decided that nature photography is worth while, the question arises should we aim at strict scientific recording to scale, or at producing a pictorial and attractive result. The enthusiasm of editors has attracted some professionals to nature photography; and the gullibility of the public has at times tempted both professionals and amateurs to foist fakes upon unsuspecting and ignorant readers. I am of the opinion that accuracy should never be seriously sacrificed to artistic effect, and I favour a combination of the two, with emphasis on accuracy, for reasons which will appear later.

Let us see, then, what nature photography can show.

1. **TYPES OF HABITAT.** Records of the haunts of the various forms of life are of great value to the ecologist. Good examples are not easy to obtain, and the botanist definitely scores over the zoologist. The Beechwood and Pinewood with their close canopy and lack of ground flora; the Oakwood with its abundant ground flora and climbers; coastal haunts of sea-birds; all these are easy enough to show.

2. **IMMEDIATE ENVIRONMENT.** These examples, as the heading suggests, give a close-up of a detail of the habitat with the organism as the central theme. A record can be made of the creature or plant in its surroundings and much can be shown that the papered background of the cabinet necessarily omits. Such are examples of protective mimicry in all its various forms, though I admit that colour is a difficulty and sometimes a very misleading impression is given by the plain black and white of the photograph. Care must be taken to choose examples that can be reasonably well shown and are normally representative (unless, of course, the abnormal is specially desired and is recorded as such).

A word of warning may be necessary against the common practice of posing insects, etc., on what the photographer considers an appropriate background. Such a practice has many pitfalls. The result may be pictorial and striking, but, too often, the posing is obvious to the field naturalist, and, unless properly described, is hardly truthful. Fakes, not described as such, are, in my opinion, definitely dishonest.

The slides of *Pyrola minor*, *Ophioglossum vulgatum* and *Neottia Nidus-avis* show the plants in their typical natural surroundings; and those of Lesser and Common Terns' nests, larvae of the lepidoptera, *Griposia aprilina* and *Gonepteryx rhamni*, and imagines of the moths, *Apatele psi*, *Boarmia roboraria*, *Lygephila pastinum*, *Lomaspilis marginata* and *Abraxa sylvata* show various types of protective colouration.

3. **HABITS AND BEHAVIOUR.** Endless opportunities occur for recording the habits of creatures in the field—the young Curlew crouching in the grass, the nest of the Little Grebe showing eggs covered and uncovered, the butterfly, *G. rhamni*, hibernating in a heather clump, a web of larvae of the moth, *Malacosoma neustria*, the spider, *Pisawa mirabilis*, carrying its egg-sac, and again guarding the large egg-tent; the crab-spider, *Misumena vatia*, with its humble bee and honey bee victims caught as they visited the flowers amongst which the spider lurks; the moth, *Achlya flavicornis*, on the twig of a birch sapling; the larva of *flavicornis* spinning its leaf shelter; the water-cups of the common teasel with drowned insects; the slough of a Grass-snake; the common Toad in defensive attitude; the snail, *Helix pomatia*, with its cemented door to the shell and the common earwig with eggs and young are examples of this type of work.

4. **BOTANICAL RECORDS** deserve special consideration. To the botanist photography is of particular value, for not only can he record habitats, but a fairly truthful appearance of the living plant—a very useful addition to the rather unattractive flattened tangles that, too often, one finds on the herbarium sheets. Here, of course, some accurate scaling will be desired by the scientific collector, and, perhaps, the least distracting from the pictorial effect is a short celluloid ruler stuck inconspicuously near the plant and at the same optical distance. Sometimes some well-known and easily recognised natural objects happen to be in the picture and can then serve usefully as a scale. Slides of the plants *Claytonia perfoliata*, *Eriophorum vaginatum*, *Anagallis ten-*

ella, *Hyoscyamus niger*, *Hydrocharis morsus-ranae*, *Orobanche hederæ*, and of the fern *Blechnum spicant* photographed *in situ* will suffice to show what I mean.

5. EDUCATIONAL WORK. This covers a vast field, not the least part of which is the work of such a society as this, where the aim is the mutual encouragement of those who have already chosen the pursuit of natural history, or some branch of it, as a hobby.

Photography is of great importance in all work aiming at interesting the public in the beauty and wonder of nature and in instructing those whose work brings them directly into contact with nature, and an understanding and knowledge of which is necessary for the successful prosecution of their business. When the aim is no more than interesting the layman some sacrifice of rigid scientific accuracy to pictorial effect may be desirable, but there must be no deliberate faking, however great the temptation. For this type of work I feel the ideal is a photograph that has, as it were, a story to tell. And here, too, some attempt at colour representation may be made with advantage. The dyes sold for tinting photographs are excellent, though in my unskilled hands success is largely a matter of chance.

The nest of the Long-tailed Tit, the bur-reeds, *Sparganium ramosum* and *S. simplex*; the plants, *Bryonia dioica*, with its reversed spiral tendrils, and *Tussilago farfara*; the beetle, *Cicindela campestris*; and the lepidopterous larva of *Notodonta ziczac* are well enough known even to the beginner in field natural history, but such common things are just the ones calculated to arouse the interest of the observant layman.

6. RECORDS MADE AT HOME. And, lastly, may I add that photography does not end in the field. Much work of recording can be done indoors; indeed, is often best done indoors. For example, the bee, *Osmia aurulenta*, just emerged from the snail shell that contained the cells; the wasp, *Eumenes coarctata*, with the mud cell from which it had just emerged, and the moth, *Cucullia verbasci*, at rest on a twig in the breeding cage, a pose I assume to be quite natural, as all my bred specimens chose similar positions.

It should always be explained that the subject was "arranged" or "controlled" when taken indoors. In the field a certain amount of "arranging" and "trimming" is legitimate, and, indeed, may be necessary to allow some feature to be shown. But over-arranged, like faked photographs, though artistic in appearance, have little value to the naturalist and hardly deserve to be classed with nature photography.

If I have departed at all from the principles laid down, it is because my slides were made originally to interest the layman in the wild life of our countryside. It was for this reason that I first took up the camera, and, having realised its great value on natural history rambles, I shall not willingly lay it aside.



PYROLA MINOR, L.

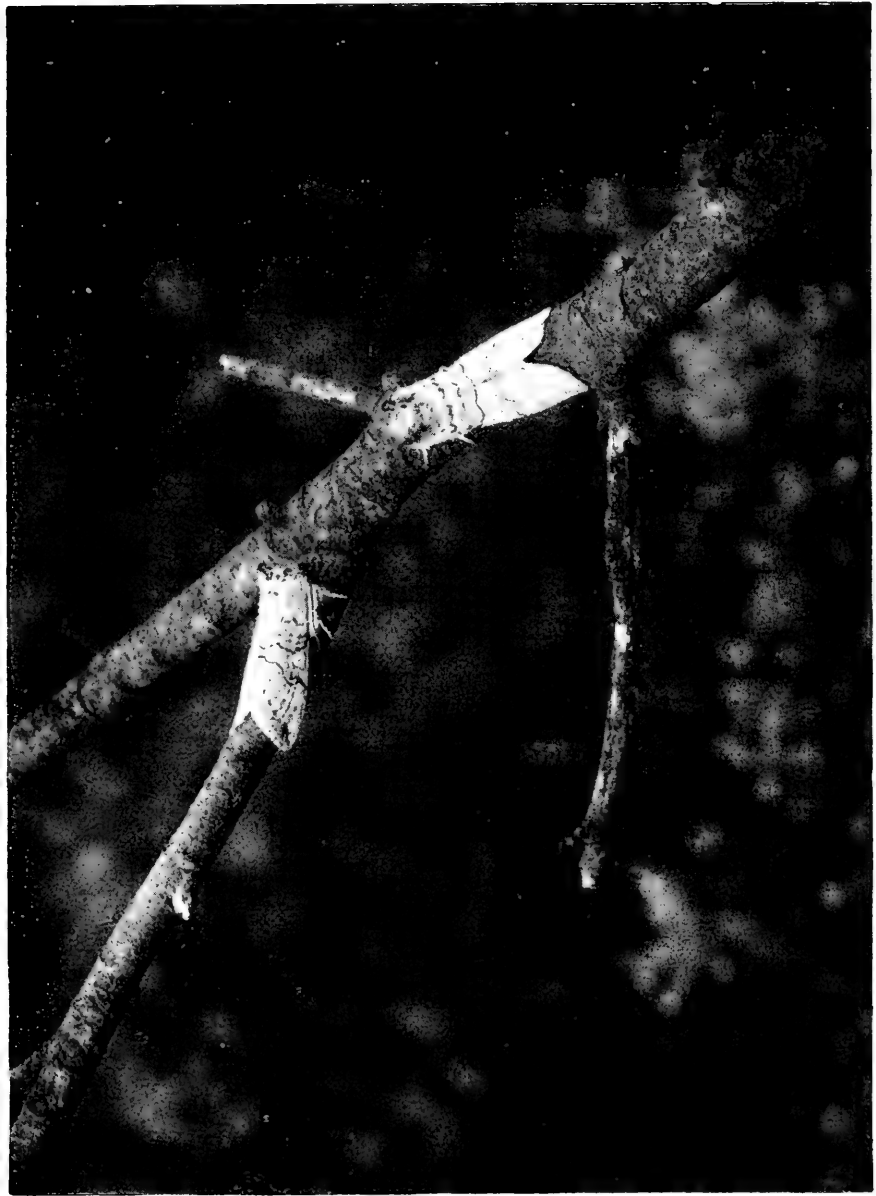




OPHIAGLOSSUM VULGATUM. L.



LARVA OF *ACHLYA FLAVICORNIS*, L.

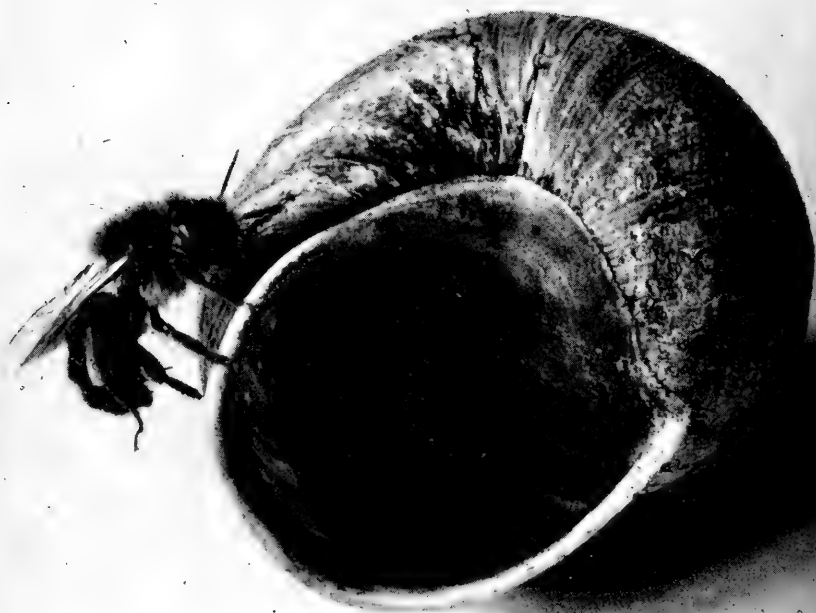


ACHLYA FLAVICORNIS, L.





LARVA OF MALACOSOMA NEUSTRIA. L.



OSMIA AURULENTA, Pz.

THE LOUSE IN LITERATURE.

By LEONARD G. HULLS, F.R.E.S.

Read 10th May 1945.

NOTE.—Lest there should be any misunderstanding concerning the title of this paper, it may at once be pointed out that it does not refer to the *Psocids* (book lice). The insect which has inspired the writer is *Pediculus humanus*, L., the common louse of man. No distinction is made between the two races, *capitis*, Deg., which favours the head, and *corporis*, Deg., which prefers the body of its host. The general term "louse" must be understood to include, where necessary, the crab louse, *Phthirus pubis*, L.

It is a curious fact that the most interesting and important insects are often of drab and uninviting appearance. A moment's thought brings examples crowding to the mind: lice, fleas, bugs, flies, mosquitoes, weevils, aphids, and so on. It has to be admitted that these insects appeal to few collectors, and it is easy to understand why so many of one's entomological friends are lepidopterists. One almost feels that the less beautiful insects are despised and neglected creatures, but, very little research proves that some of them, at least, have a glory all their own. The louse is a very good example of this, and, in this paper, an endeavour is made to illustrate the fact by reference to the position of the louse in literature. This treatment of entomology forms a pastime to be thoroughly recommended, especially for long winter evenings. One roams about in the past, living for a while with grand old naturalists in a golden age when, paradoxically, so much that was old was new. Many of them, it is true, were collectors, but their collections were of a miscellaneous nature, and reflected the tremendous breadth of their interests. There was no question of collecting moths and butterflies because they were pretty and looked well in cabinets or on the wall. One has only to read such works as the *Correspondence of John Ray*, or Réaumur's *Memoires*, to become convinced of all this. And so to the louse.

It is unfortunately true that in these present days of war, and the semi-permanent coiffure, the louse is coming into its own again. Nurses and hairdressers are all too painfully aware of this fact, and, it is a sign of the times that at one young ladies' college, students returning after vacation are compelled to produce a doctor's certificate which declares that their heads are free from vermin. It is to be hoped that we shall not return to the good old days of general lousiness, when it was not an unknown thing for a lady to discover a nest of house mice in her hair. In the early days of the microscope the louse was the most popular object for observation, an honour which it shared to some extent with the flea and the bug. This fact, of course, tells its own story with

particular clarity. Even so recently as 1829, in Gould's *Companion to the Microscope*, we find the first three items in *A General list of the Principal objects which afford the highest entertainment and instruction*, are, the louse, the flea, and the bug.

Dealing first with non-scientific literature, references to the louse are so numerous that it becomes a problem of choosing a few of the most interesting. The *Bible* forms a convenient starting point, and from it may be quoted:—

“And the Lord said unto Moses, Say unto Aaron, Stretch out thy rod, and smite the dust of the land, that it may become lice, throughout all the land of Egypt. And they did so; for Aaron stretched out his hand with his rod, and smote the dust of the earth, and it became lice in man and beast.”—*Exodus*, viii, 18.

One is forced to wonder how often Thomas à Becket was reminded of this original generation of lice, for it is recorded of him that he was very thoroughly lousy. Here we may quote from Zinsser's *Rats, Lice, and History*, although the book should really have been reserved for mention later on, in the section dealing with scientific literature:

“The Archbishop was murdered in Canterbury Cathedral on the evening of the 29th of December. The body lay in the Cathedral all night, and was prepared for burial on the following day. The Archbishop was dressed in an extraordinary collection of clothes. He had on a large brown mantle; under it a white surplice; below that, a lamb's wool coat; then another woollen coat, and a third woollen coat below this; under this there was the black, cowled robe of the Benedictine Order; under this a shirt; and next to the body a curious hair-cloth, covered with linen. As the body grew cold, the vermin that were living in this multiple covering* started to crawl out, and, as McArthur quotes the chronicler: ‘The vermin boiled over like water in a simmering cauldron, and the onlookers burst into alternate weeping and laughter’.”

Throughout the centuries, the louse seems to have inspired writers, artists, and poets. Shakespeare, Milton, Dryden, Swift, and other notables of the past all refer to the insect. Swift appears to have been a little uncertain about his natural history when he remarked, “Not that I value the money the fourth part of the skip of a louse.” Fortunately for mankind, the louse is not given to skipping about: its all-out speed has recently been estimated at nine inches per minute. Somewhere at the beginning of the eighteenth century, one Mr Willis, of St Mary Hall, Oxon, wrote *A Comical Panegyrick on that familiar Animal by the vulgar called a Louse*. The two following stanzas are taken from it:

“Tremendous Louse, who can withstand thy Power,
Since Fear at first, taught Mortals to adore?
What mighty Disproportion do we see,
In Adam's Glory, when compared with thee?

Who can thy Power describe, thy Glories scan,
 Thou Lord of Nature, since thou'rt Lord of Man?
 In these we may thy wondrous value see,
 The World was made for Man, and Man for thee."

One poet devoted considerable attention to the louse in writing a *Lousiad*, in 5 cantos. He was Dr John Wolcot, who wrote under the name of Peter Pindar, and his *Lousiad* occupies some 112 pages of volume 1 of his works, published in 1816. By way of introduction, he prefixes a note to the reader which commences:

"Gentle Reader, It is necessary to inform thee that his Majesty actually discovered, some time ago, as he sat at table, a louse on his plate. The emotion occasioned by the unexpected appearance of such a guest can be better imagined than described. An edict was, in consequence, passed for shaving the cooks, scullions, etc., and the unfortunate louse was condemned to die."

Turning to scientific literature, for the purposes of this short paper it is again a question of choosing interesting examples from a mass of material. Pride of place may be given to an old botanical work, *The Hortus (ortus) Sanitatis* or *Garden of Health*, printed at Mainz in 1491 by Jacob Meydenbach. This old Herbal is of particular interest for reason of its quaint illustrations, that of the louse being especially amusing. We see a wife brushing lice from her husband's head into a bowl; and, judging from the look of serenity on the gentleman's face, the process appears to be soothing. This book, besides dealing with the virtues of herbs, contains accounts of animals, birds, fishes, and stones. Information on the louse is given thus:

Isidore. "Lice are skin worms named (pediculus) after their feet, hence people are called lousy in whom lice spring up in their bodies."

De Naturis Rerum. "Lice get their name from the number of feet they have. This pest is undoubtedly created from the very flesh of men, and yet invisibly. Some say that these are generated by the sweat of men, others from the pores and the evaporated humours."

(The translation is that given by the B.M.)

In pursuing the louse through scientific literature one is bound to encounter the two 17th century Dutch naturalists, Leeuwenhoek and Swammerdam, and this, in itself, is a pleasure of some consequence. Both dealt with the insect, and their written accounts truly reflect their markedly opposite temperaments. Leeuwenhoek, who has been described as one of the most original men who ever lived, conducted his researches in a spirit of carefree gaiety. His remarkable work, much of which is recorded in the early volumes of the *Philosophical Transactions*, includes observations on such diverse creatures as the louse, the elephant, and the whale. His paper on the louse ends with the remark

"So much for this lousy chat." One is not surprised to learn that he kept a pair of lice in a stocking which he wore night and day until such time as he had solved the problem of the number of eggs laid by the female.

Poor, melancholy Jan Swammerdam, on the other hand, treated the louse much more seriously, seeing in it a miracle of God. His paper on the insect is addressed to "Mr Thevenot, formerly ambassador from the King of France to the republick of Genoa." It begins thus:

"Most illustrious Sir, The omnipotent finger of God is presented to you in the following sheets, in the anatomy of a vulgar and loath insect, the louse . . ."

Swammerdam's description of the louse occupies some seven folio pages of the English edition of his *Biblia Naturae*, and there is a whole page plate of figures. In the index of this book we find a unique entry:—"God, his omnipotence displayed in the human louse." After the description there is a concluding letter to Mr Thevenot which is worth quoting fairly fully:

"All these things, most illustrious Sir, while I viewed them, I have carefully delineated with my own hand, as you may see by the figures annexed. I shall now leave you to judge, whether chance, by any right, can claim even the least part in the most artful structure of the small point of the universe which is here exhibited; since so many and such different miracles jointly proclaim in it the divine omnipotence. Wherefore though this animal is of no advantage to the body, yet it is able to raise our thoughts to God, so that by seriously contemplating the divine majesty, and the glittering rays of his miracles, in this little animal, we may, with the most submissive humility, change and contract our vain pride into as small a point . . ."

Swammerdam ends with the words:—"The end of the wonderful anatomy of the louse." We may feel sure that he laid down his pen with a sigh, and not, as Leeuwenhoek must have done, with a broad grin.

It is unusual to find the author of a work on natural history apologising for the inclusion of a particular insect. Shaw, in his *Naturalist's Miscellany* published at the end of the 18th century, was dubious about including the louse although he had no qualms concerning the flea. Despite the fact that the accompanying engraving makes the louse appear almost a thing of beauty, Shaw felt it necessary to add:

"To introduce an animal of an appearance so inelegant as the present into a work of this nature, might almost seem a violation of the plan announced in its title. There are, however, circumstances in its history, and particulars in its conformation, which are well worthy the attention of philosophic enquirers; and if it cannot be considered as beautiful, it may at least be numbered amongst the more curious productions of nature: it may also be added, that it has from time immemorial been con-

sidered as a kind of companion (though surely of a far less elegant character than that cleanly animal) to the flea, already described in the present work." After describing the insect as revealed by the microscope, the author concludes:—"To what I have said respecting this animal I shall beg leave to add the lines of Serenus, as an attempt towards discovering an apparent intention of providence in permitting the frequency of such unpleasing animals."

"See nature, kindly provident, ordain
Her gentle stimulants to harmless pain;
Lest man, the slave of rest, should waste away
In torpid slumber life's important day."

In *Phil. Trans.*, No. 284, p. 1357, Sir Charles Holt, discussing the qualities of his microscope, says:—"In a living louse I could plainly see the motion of the muscles (when he stirred his legs) all which are joined in a longish dark spot in the middle of his breast. . . . But the most entertaining sight is the peristaltick motion of the intestines, which is continued from the stomach through all the guts to the anus. I have observed the like peristaltick motion in the flea, and in several sorts of small transparent maggots and caterpillars. But a louse will bear rougher handling, and live confined between two concave plates, if not crushed, four or five days." It is not recorded whether or no the specimen was taken from Sir Charles's own periwig.

It is possible that, so far, these notes have created the impression that interest in the louse is confined to bygone days; that its frequent appearance in literature is confirmed only by consulting ancient tomes. Such an impression will be at once dispelled by the realisation that there exists a modern book devoted entirely to the louse. Prof. Buxton in *The Louse: an account of lice which infest man, their medical importance and control*, 1939, has provided a volume of very great interest and importance. In it may be found all the information on lice and lousiness that one can desire. The list of references at the end of the book, leaves one in no doubt as to the importance attached by scientists to a thorough understanding of the insect in question. Thus it becomes certain that, in the future, an enquirer, seeking the louse in literature, will have far greater scope than the present writer. Nevertheless, for quaintness and ingenuity relating to the study of the louse, it will always be necessary to return to the days of such men as Leeuwenhoek and Swammerdam.

It is hoped that these notes will have proved of some interest to those who are accustomed to look only on the brighter side of entomology, as exemplified by the lepidoptera. It is strange but true that the lowly louse has a far greater story to tell than many of the latter. To seek it in books is an entertaining and instructive pastime. The searcher may be led, for the first time, to wander among the pages of the early volumes of the *Philosophical Transactions*, or make his first real acquaintance with the old naturalists. Should this be so, he will for ever be grateful to the much maligned *Pediculus humanus*.

LEPIDOPTERA OF THE COASTAL SANDHILLS OF LANCASHIRE.

By J. K. MATTHEWS, M.A.

Read 13th June 1945.

Before speaking of the lepidoptera of the Formby coast I would like to be allowed to say a few words about the plant life. It is very interesting to observe the changes of vegetation if one follows a line from the shore inland. Just above the high-water mark is the region of blown sand. Here are sandhills more or less held in shape by the marram grass planted by man, adapted as it is to the purpose by means of its deep roots, spreading underground stock, and spike-like leaves capable of withstanding wind and drought.

While these sandhills with their marram grass fight a rearguard action against the elements, those in the more sheltered positions behind them are stabilised by reinforcements chiefly in the form of the recumbent sallow, *Salix repens*, L., and the dewberry, *Rubus caesius*, L.

I may say that I shall try to adhere throughout this paper to the names for lepidoptera given in South's latest edition. For example, I shall have to call dear old *bifida* "*hermelina*". But I would like to say this—in contrast with the names of moths and butterflies which are being continually re-shuffled, the present-day names of flowers are to a very great degree the same as they were in the botanical text-books of my boyhood. I do not wish to be guilty of ignorant criticism of our leaders, but I will say that it is the duty of leaders to lead their followers into the light and not into confusion. If all these changes are passing phases in the search for finality, then I say may they reach finality soon.

Unappetising as the marram grass may be, it is the foodplant of the larvae of one moth in great numbers, namely *Leucania littoralis*, Curt., or the Shore Wainscot. The larvae are to be found on the outer or most westerly edge of the sandhills, and could be obtained in the day-time by scratching in the sand—a waste of time if you can go after dusk with a lamp when the larvae are very conspicuous on the tall marram grass spikes. In captivity they need a good depth of sand to clean themselves and plenty of space and food. Otherwise they are rather liable to bite each other.

Just inland behind the outer range of sandhills lie the grounds for *Dasychira fascelina*, L., whose larvae feed on the dewberry. Some of the best patches for *fascelina* have been buried by blown sand. One year there may be a carpet of young dewberry on which you could find say a dozen larvae as a result of an afternoon's close search; and next year there may be nothing visible but blown yellow sand left by the winter's gales beneath which the young hibernating larvae must have perished. If the covering of sand is not too deep the dewberry grows through again, as it takes a lot of burying to discourage either the dewberry or the recumbent sallow. Half-a-century ago *fascelina* was

more numerous, and fed in conspicuous positions on the recumbent sallow.

Similarly situated there is a good deal of the Burnet rose, *Rosa spinosissima*, L., and we often look again for the *Nyssia zonaria*, Schiff., which we used to find at Blundellsands a few miles south of Formby. There are no *zonaria* at Blundellsands now, the whole area having been built on. It is interesting to note that one of the old *zonaria* grounds has been the subject of coast erosion at Hall Road, and the houses and gardens built upon it have been washed away by the tides. Entomologists might consider this as a warning to builders. A single full-grown larva in the jaws of a tiger beetle, *Cicindela hybrida*, L., var. *maritima*, Dj., observed last summer, gives some hope of re-discovery.

Sheltered behind the outer range of sandhills at Formby there are some small areas of low-lying and damp flats or flashes. These are generally dry in summer and are a botanist's paradise, studded with the flowers of *Parnassia palustris*, L., *Pyrola rotundifolia*, L. (winter-green) and the pink *Centaurium umbellatum*, Gilib., the yellow *Blackstonia perfoliata*, Huds., and in occasional wet dykes *Hottonia palustris*, L. (the water violet), *Menyanthes trifoliata*, L. (Bog-bean) and *Typha latifolia*, L. (Reed Mace).

My selected site for finding the larvae of *Actebia praecox*, L., would be a nice round knoll of clean sand covered with *Salix repens*, L. If you get the right places at the right time (May) you should be able to find as many *praecox* larvae as you want by scratching in the sand round the edge of the knoll under the young green terminals of the sallow. The moths come freely to light in August, usually in good condition.

Proceeding inland just a few more yards we come to the *Lasiocampa trifolii*, Schiff., ground. Although the larvae are fairly widespread over the sandhills they are more numerous nearer to the coastline, provided always that they are out of reach of the blown sand and on land carrying leguminous plants like *Ononis repens*, L., *Lotus corniculatus*, L., and *Anthyllis vulneraria*, L. In captivity they feed on grasses and many leguminous plants, including laburnum. The larva is very easy to find when it is about half-grown, just before dusk on tall grass stems. When it is bigger it is more difficult to find as it keeps low in the very thick vegetation. Early morning just before sunrise is said to be the best time. I have not tried it. When I was a boy I used to hear entomologists boast about their success in "assembling" male *trifolii* moths, but I have never been able myself to get any results whatever.

Before leaving the blown sand belt there is one more thing to be mentioned, namely, the stunted shrubby poplars of two kinds, the white leafed and the balsam. No amount of drifting sand seems able to discourage these, and year after year the frass on the smooth dry sand in which they stand invites you to find the larvae of *Laotoë populi*, L., *Smerinthus ocellatus*, L., *Cerura vinula*, L., *C. hermelina*, Goeze, *Apatele megacephala*, Schiff., *Leucoma salicis*, L., *Notodonta ziczac*, L., *Pheosia tremula*, Cl., and occasionally *Apatele leporina*, L.

Pursuing our inland way we now traverse a belt some hundreds of yards deep of sandhills thoroughly stabilised by their clothing of plant life. Here and there are solitary hawthorn shrubs, sown no doubt by birds, on which the larvae of *Nola cucullatella*, L., are found in large numbers.

Next we pass by masses of a prickly-looking shrub, *Hippophaë rhamnoides*, L., the Sea Buckthorn, studded with orange berries in the autumn. This is a foreigner and a comparative new-comer. It occurs in very few places in the British Isles, and always on the coast. It is supposed that the seed has been water-borne. Quite possibly the seed has been dumped in the Mersey in the ballast of an incoming ship, and tides and currents of water and wind have borne it to its seat of germination. Certainly it has obtained a firm foothold on Formby Point, and its spread inland may be attributed to the distribution of its seeds by birds. The larvae of *Euproctis similis*, Fuessl., and of *Leucoma salicis*, L., have resorted to it as a food plant recently.

The landward side of the sandhill range is planted with pine trees, and in these plantations there are clumps of alder, poplar and birch, and sheltering behind the woods are the golf links and asparagus farms. An interesting thing about the asparagus plant is its red berry containing black seeds in rather a sticky mucilaginous pulp. The birds eat the sticky pulp and not the red skin nor the seed; and in order to deal with it they have to carry the berry to a dining table. The result is that in the neighbourhood of the asparagus fields every stone or stump of wood in the autumn is splashed with red skins and surrounded by asparagus seedlings, resulting from the previous years' orgies. There is something about the soil (or should I say sand) and climate of Formby, highly conducive to seed germination. For this reason one is continually finding new and unexpected plants. Just outside my back garden there is a patch of St John's Wort, I think *Hypericum quadrangulum*, L. (*dubium*, Leers). I may be wrong in thinking that it originated from seed borne by natural agency. It may have been an out-throw from a garden. But the extraordinary thing is this—we know of no other *Hypericum* in the district other than these few square feet of it, and yet Mrs Fraser found on it the larvae of *Anaitis plagiata*, L., and bred them, they also constituting a new record for the locality.

I mentioned the golf links, and I may add that they are of some comfort to us entomologists. Remote from the sandhills which are being trampled by military operations, or dug up for glass manufacture, or flattened out for asparagus beds, the land between the fairways of the golf links lies untouched, untrodden and almost unseen, generation after generation. I have never known any places where the common things fly in such abundance as they do in some of the sequestered parts of the Formby sandhills. There are sheltered hollows which are alive with *Zygaena flitpendulae*, L., pushing each other off the flowering heads of the ragwort, and where you kick up a cloud of *Maniola jurtina*, L., at every step, even far into the evening.

These clouds of insects in flight may distract your eye from some especially pink *Phytometra viridaria*, L., or an especially blue female of *Polyommatus icarus*, Rott., or a particularly large male or female. Speaking of large specimens, I may say that several visitors have commented on this peculiarity of the district, and our exhibit includes some large specimens of *Polyommatus icarus*, Rott., *Lasiocampa quercus*, L., var. *callunae*, Palmer, *Cerura vinula*, L., *Biston betularia*, L., *Notodonta ziczac*, L., *Pheosia tremula*, Cl., *Notodonta dromedarius*, L., *Euphyia bilineata*, L., and *Lothoë populi*, L.

In connection with the great abundance of certain common insects, I have mentioned *Z. filipendulae*. Its larvae feed on leguminous plants in the hollows between the sandhills and in a dry spring I have seen them on the march for fresh supplies of food. Another larva sometimes in great profusion is that of *Phragmatobia fuliginosa*, L. This is a double-brooded insect, or treble brooded if it gets an early start. Sometimes, in November, there are areas covered with such large numbers that you can hardly put your foot down without treading on them. The arithmetical multiplication of a moth with three broods leads rapidly into astronomical figures, and nature takes steps to preserve the balance. In my own experience nine out of ten of the November larvae are stung by a dipterous fly, and in the following year comparatively few moths are seen on the wing.

I mentioned the *filipendulae* swarming on the ragwort heads: later in the season these flowering heads are a good hunting ground for pretty varieties of *Hydroecia oclea*, L. I don't know whether any of these varieties have any claim to specific rank. Our range is shown in our exhibit and includes the red-spotted var. *erythrostigma*, Haw.

There are some deplorable encroachments on the pinewoods by way of the felling of the trees in these days of shortage of timber. The needle-laden earth, grey, brown and desolate where a pine plantation has once stood, is a depressing sight. Nor is there, in the course of time, a reversion to the old flora of the sandhills on which the pines were originally planted. For the most part coarse weeds are the first to appear, thistles, nettles, ragwort, etc. But there are two weeds prevalent in Formby worth mentioning. One is *Epilobium angustifolium*, L., the flowering willow or rosebay, which used to be a rarity forty years ago and whose wind-borne seed has caused it to become a menace to agriculture. This weed is not only flaunting its pink blossoms in the graveyards of coniferous plantations, but is covering acres of the spoil heaps of the Lancashire mining districts, and is even springing up among the rubble of the bomb-devastated areas in the middle of Manchester. The other weed which I would like to mention is *Claytonia perfoliata*, Donn. In the botany books of half-a-century ago it was stated to be a rarity, and the few places where it could be found were enumerated, including a lane by old Formby Church. To-day I have to hoe it down in regiments in my garden, and on some parts of the old pine plantations where the needles are not too thick it is spreading its green carpet.

Of the pine-loving moths we have ventured to exhibit *Ellopiia fasciaria*, Schiff., *Plemyria bicolorata*, Hufn., *Panolis flammea*, Schiff., and *Semiothisa liturata*, Cl. In my collection the *flammea* is unique, it being the only moth of which I have taken my series in a tray when beating for larvae. *Liturata* figures in our exhibit of dark types, namely, var. *nigrofulvata*, Collins.

The clumps of alder trees yield plenty of larvae of *Hydriomena coerulea*, Fb., the May Highflyer, by beating in the autumn, or they can be taken on the wing in June, together with some large and nicely marked *Euphyia bilineata*, L., and don't discard the shabby-looking ones because they will be *Euchoeca nebulata*, Scop., the Dingy Shell, which you can tell immediately by their habit of folding their wings in an upright position in the net. The pretty little *Hydrelia flammeolaria*, Hufn., occurs with these two. *Hydriomena ruberata*, Frr., also occurs, but not commonly. We have not taken *Apatele alni*, L., yet in the alder woods of Formby, but we propose to do so. *Alni* certainly occurs in the district—probably as plentifully as anywhere else. Miss Bird of the Lancashire and Cheshire Entomological Society took a full-grown larva in the alders in 1942, but although it pupated the moth did not come through. In the previous year a larva was taken a few miles inland and sent to Mr G. de C. Fraser. It fed on rhododendron and a very dark black-throated moth emerged. Other larvae have been taken—fate unknown. The dark specimen is included in the exhibit and, for comparison, a specimen from Burnt Wood in Staffordshire.

On the alders and birches the larvae of *Apatele leporina*, L., can be taken. As usual, the var. *bradyporina* Treits., deputises for the type, with var. *melanocephala* (described by Mansbridge) as a strong runner up. Var. *semi-virga*, Tutt, also is found. Last year larvae were abundant.

On the birches the larvae of *Biston betularia*, L., can be obtained. I remember one of your members being with us on an occasion when we were beating even more productive birches on the mosses inland, and he asked about his chances of getting ab. *carbonaria*, Jordan. The fact is that we get very few other than the melanic variety and transitional forms approaching it, only one or two in a hundred being the peppered type.

The birches, willows and poplars give a good series of the Notodontidae:—*Cerura hermelinea*, Goeze, and *furcula*, L. (sometimes); *Cerura vinula*, L., in quantities and of great size; *Pheosia tremula*, Cl., and *gnoma*, F., the Swallow Prominents; *Notodonta ziczac*, L.; and *dromedarius*, L.; *Lophopteryx capucina*, L., the Coxcomb.

To this group of species, attractive both as larvae and moths and easily obtainable year after year, I attribute the beginning of much enthusiasm for entomology on the part of many of our young folk. What a pity it is that it is discouraged and ignored, or even prohibited in so many schools, and that the incidence of term-times and holiday-times make it difficult for a schoolboy to follow up the life-cycle of so many of his captives.

Of the Notodontidae mentioned, one is liable to provide disappointments: a very large proportion of the *tremula* larvae are stung, and furthermore, moths are liable to be extremely restless immediately after emergence, battering their wings very badly. One point of interest is the large size, e.g., of some of the *tremula* and *ziczac*, both bred and taken at light.

Many of the trees in Formby, chiefly poplar and willow, suffer damage from the larvae of *Cossus cossus*, L., the Goat Moth. I remember an enthusiastic visitor to Formby finding a poplar sapling with all the external evidence of this infestation at the base. In spite of a certain rotundity of figure he lay on the ground and tickled out about half-a-dozen young larvae with stiff grass stems, whistling all the while as was his habit; and my small boy, no doubt with the story of the Pied Piper fresh in his mind, was convinced that he was whistling them out. I have never tried to rear the young larvae owing to the difficulty of feeding them and the length of time involved. The best time to take the larvae is in the autumn of the year of their maturity, when they go for a walk before pupating. Of the hawk moths, I have mentioned the numerous larvae of *Laotoë populi*, L., and *Smerinthus ocellatus*, L., on poplars and willows. These and the two elephants are the four reliable natives. A single *Mimas tiliae*, L., has been taken in the district, and last year a battered *Herse convolvuli*, L. From time to time *Acherontia atropos*, L., is reported from the potato fields, and two *Celerio livornica*, Esp., were taken by Fraser in 1931, there having been no record since. He also took *Celerio galii*, Rott., on the coast a few miles south of Formby in 1888, the great *galii* year.

In the course of my talk I have mentioned the reversionary forms of *leporina*, *betularia*, *alni* and *liturata*.

Others which are found in Formby and are in our exhibit here are:—*Gonodontis bidentata*, Cl., var. *nigra*, Prout; *Phigalia pedaria*, Fb., var. *monacharia*, Staud.; *Philudoria potatoaria*, L., yellow and chocolate male; *Apamea monoglypha*, Hufn., dark forms; *Tethea duplaris*, L., dark forms; *Hydriomena coerulata*, F., dark forms; and among the butterflies *Maniola tithonus*, L., var. *mincki*, Seebold.

I am very conscious of the great gaps in our talk about Formby lepidoptera—nothing about micros, little about butterflies, taeniocamps and whole families of geometers, etc. But your Secretary—very wisely, I think—wrote to me "Give experiences and not lists," and before I finish I want to refer to two experiences of which I have the liveliest recollections.

On 5th August 1938 we entertained the members of a small but enthusiastic Entomological Society from one of the textile towns of Lancashire. The main operation was lamping on the sandhills. As you are no doubt well aware, no one can command or predict the right climatic conditions for entomological success, and very often when you have to show off your own home ground to visitors, things fall very flat. Lamping, like sugaring, may offer the extremes of a dull failure or a breath-

taking success. This night was one of the successes. Never before had we seen moths coming to light in such bewildering numbers. More than thirty species of macro-lepidoptera came to the sheet—some of them such as *Lasiocampa trifolii*, *Notodonta ziczac*, *Actebia praecox*, and *Agrotis vestigialis*, Rott., in veritable hordes. Many micro-lepidoptera and not a few coleoptera also appeared.

My last word is about *Leucoma salicis*, L. But before I speak of it I just want to mention that *Carsia paludata*, Thnb., has been included in our exhibit. Perhaps it is a little outside our terms of reference, not being strictly a coastal moth, but being found inland on the moss where its food plant, *Vaccinium oxycoccos*, L., grows. Now about *salicis*. Forty years ago I can remember the larvae being almost a plague on the poplar trees in the suburban gardens along the coast, but in recent years it has been much less noticeable. I have no doubt that it has persisted in quantities, but very much more locally. In 1942 and again this year there were a great many larvae on a comparatively small clump of stunted balsam poplars close to the shore. It was a brilliant July day with a hot sun in a blue and cloudless sky. I want to try to depict to you the clean yellow sand etched by the wind in wavy lines and ripples, and here a bed of Burnet-leaved rose sheltered by the poplars, around whose blossoms numerous Dark-green Fritillaries are hovering. Mingled with the Burnet roses are scores of freshly-emerged Satin Moths glistening white in the sunlight. This was July and the year was 1942, a year in which photographic films, plain or coloured, were difficult to obtain. This was a sight the like of which you do not often see in a life-time. That I could not immortalise these colours of earth and flower and insect in a lantern slide, to call them back in the grey winter days, is just one more thing for which I will never forgive Mr Hitler.

ON THE ECONOMY OF THE OAK MARBLE GALL (CYNIPS KOLLARI, HARTIG.).

By K. G. BLAIR, D.Sc.

Read 11th July 1945.

This well-known and generally abundant gall was apparently first notified as occurring in Britain only in 1854, when reported from Devon, though it was later stated to have been known in the Exeter district for some twenty years previously. For some time it was known as the Devonshire gall, though in 1874 it was referred to as by then abundant everywhere. For a long time efforts seem to have been concentrated on the vain attempt to find the male, for of course the agamic generation of these gall-flies had not then been demonstrated. It was, however, soon realised that a very large number of insects of different orders could be reared from them. Of these the great majority, indeed, have no intimate connection with the galls, but many no doubt had been merely hibernating or sheltering in the cavity of the vacated galls, while some perhaps were bred from the buds or twigs on which the galls were situated; but even so the number of species that habitually obtain their nourishment from the gall substance or from its inhabitants is in itself quite considerable. Thus besides the gall-maker there are inquiline, belonging to the same family, Cynipidae, of which the larvae feed on the gall substance, and the parasites of each of these, belonging to the family Chalcididae.

Most rearers of the galls are content with recording the numbers of insects of these different categories that they obtain; very few attempt to name the various species of Chalcidids and no one, so far as I know, has attempted to determine what parasites are associated with the several hosts, and these notes are merely a record of my own efforts to establish such relationships.

To take as a basis of observations Connold, 1908, *British Oak Galls*, we find for example five species of inquiline listed and ten species of parasites, as follows:—

INQUILINES.

Synergus facialis, Ratz.
S. melanopus, Mayr
S. pallicornis, Bris.
S. reinhardi, Mayr
Ceroptres arator, Mayr

PARASITES.

Torymus regius, Mayr (*devoniensis*, Parf.)
Syntomaspis caudatus, Walk.
Megastigmus stigmaticus, Walk.
Eurytoma rosae, Nees
Ormyrus punctiger, Westw.
Pteromalus tibialis, Walk.
Macrocentrus marginator, Nees
Homalus auratus, L.
H. coeruleus, Fab.
Odynerus trifasciatus, Oliv.

though how he arrives at this list is a mystery, since many of these have obviously nothing to do with the galls beyond utilising them as shelters, while other species frequently recorded are omitted altogether. Thus the *Odynerus*, an Aculeate, is no parasite, though it may occasionally nidificate in an empty gall; the two species of *Homalus* are cuckoos in the nests of small Aculeates, and may have been thus utilising cells of *Prosopis* or *Rhopalum* similarly occupying old vacated galls. *Macrocentrus* is a Braconid parasite of Clearwing larvae, also recorded from the twig-boring larvae of certain beetles, and may have come from a larva of the sawfly, *Janus femoratus*, Curt., that bores in the oak twigs. That it could adapt its usually elongate cylindrical cocoon to the round cell of the *Cynips*, though not perhaps altogether out of the question, is very unlikely. The Chalcids that remain are all probably direct parasites either of the *Cynips* or of one or more of its inquilines, or hyperparasites of them through one of their own family. It was in an effort to settle these host relationships that this inquiry was undertaken.

A start was made by isolating individual galls and investigating the origin of each fly as it emerged; also by opening the galls after emergence had ceased and noting the cells containing dead Chalcids that had failed to emerge; but by far the most productive method was to open the cells before emergence was due, segregate the larvae or pupae from the different types of cell and rear them to maturity.

The cells in the gall fall readily into one or other of three different types: first the single large round central chamber formed by the gall-maker; this is frequently replaced by a group of about ten cells, formed by one of the inquilines which I take to be *Synergus reinhardi*, Mayr, and thirdly, odd cells embedded in the spongy tissue between either of these and the outside of the gall; these I take to be *Synergus melanopus*, Mayr. Of the five species of inquilines listed by Connold I have so far only been able to recognise these two:

1. Cells of *Cynips kollari*, Hartig, the gall-maker. First determined by Westwood as *C. quercus-folii*, L., and in early records usually appearing as *C. lignicola*, Hart. Forms a single round cell at the centre of the gall. Usually the gall attains a good size, though occasionally it will be found in a small or even very small (pea-size) gall. The flies mostly emerge in the autumn of the year in which the gall is formed, though a few of them will lie over as larvae until the following summer. It is a stout, soft, hairless larva, with the small head deeply sunk in the prothorax. If the gall containing an overwintering larva be opened it will seldom survive. Frequently instead of the *Cynips* larvae will be found the much firmer hairy larva, tapering to each end, of *Torymus regius*. Mayr, the only parasite I have as yet found in these cells. In spite of the gall being opened these larvae will nearly all duly pupate and produce the fly the following spring.

2. Cells of *Synergus reinhardi*, Mayr (fly with head and face dark in both sexes). The cells form a central group of about ten in the gall, replacing the single cell of the *Cynips* and together occupying a larger

space. The presence of this inquiline is therefore completely lethal to the *Cynips*. Sometimes a very small round cell may be seen in the midst of the *Synergus* group, suggesting that their development when the *Cynips* larva and cell were still very small inhibits the growth of the latter and thus brings about its early death. These cells may be found in full sized or small galls, especially the latter. In fact, nearly all small galls, even very small, no larger than a pea, contain *S. reinhardi* cells to the exclusion of *S. melanopus*, and it was thought that these, though forming a similar group of cells, might be specifically distinct from those of fully grown galls, but apart from their smaller size no difference in the flies could be found.

From these cells I have obtained the following parasites:—

- Torymus nigricornis*, F., smaller and with shorter ovipositor than the *Torymus* from the *Cynips* cells; hind femora pale, only slightly clouded with green.
- Syntomaspis caudata*, Walk. (?), femora mainly dark metallic green with whitish knees.
- Megastigmus dorsalis*, F., head and thorax largely metallic green above, pale yellow beneath; wings with large black stigmatic spot; ovipositor of ♀ long. This is perhaps the *M. stigmaticans* of records, though the latter, according to specimens in the British Museum, is larger and the metallic green colour more extensive.
- Eurytoma rosae*, Nees (Black, with head and thorax rather coarsely punctate; abdomen shining and petiolate). I have found no sign of the larva breaking through from one cell to another and devouring more than one Cynipid larva, as described for this species in the galls of *Rhodites*, though it is perhaps significant that the cells of the host are in close juxtaposition. Indeed, one may suspect that it is at least a race distinct from that inhabiting the rose galls.
- Mesopolobus fasciiventris*, Westw. (a Pteromaline with yellow legs and antennae in both sexes though brightest in the male, which sex also has enlarged yellow palpi). It occurs in considerable numbers but the exact role played by the larva is not yet ascertained.
- Pteromalus* sp. (*tibialis*, Westw. ?). Smaller and darker than the last, and found only in small numbers. Possibly a hyperparasite.

In very small galls the incidence of parasitism was found to be comparatively low, the percentages of the emargences (220 flies) being as follows: *Synergus* 68%, *Megastigmus* 24%, *Eurytoma* 3%, *Mesopolobus* 4%, other species 1% (1 each of *Entedon* sp. and *Tetrastichus* sp.).

3. Cells of *Synergus melanopus*, Mayr (Face yellow, brightest in ♂). The flies and parasites from these cells are readily obtained without admixture by segregating galls from which the *Cynips* has already escaped. Many of these, of course, are not infested with the *Synergus*, but such galls should be split as well as those with no exit holes, and galls containing the *Synergus* put aside. Cells occur singly, scattered in the

peripheral spongy tissue of the gall, usually near the surface. Generally in full sized normal-looking galls, either with *Cynips* cell at centre or with group of *S. reinhardi* cells, with the development of neither of which does it seem to interfere. From these galls I have reared:

Torymus nigricornis, F.

Torymus abdominalis, Walk., with yet shorter ovipositor and the base of the abdomen beneath reddish.

Metopolobus fasciiventris, Westw.

Pteromalus sp. (? same as above).

Megastygmus dorsalis, F.

Connold and most authors also give *Ormyrus punctiger*, Westw., distinct in its small size (probably a multiple parasite) and heavily pitted 2nd and 3rd segments of the abdomen, reported to have been reared from dwarfed galls, but I have so far failed to meet with it, nor does the British Museum contain specimens reared from this gall. Possibly it is associated with the Cynipid inquiline *Ceroptres*, which has also not occurred to me.

Besides these Cynipid inquilines, larvae of various other orders feed regularly on the gall substance. Of such I have met with:

Pammene (*Ephippiphora*) *gallicolana*, Zell. (Lep., Tortricidae), in the spongy tissue, usually in galls of which the hard outer shell has been broken, probably by tits.

Diptera (Cecidomyiidae), similarly riddling the spongy tissue of the gall, also where broken.

Yet others habitually make use of the vacated galls for shelter or for hibernation.

Symphorobius pygmaeus, Ramb. (Neuropt., Hemerobiidae). The larva frequently utilizes empty galls in which to spin its cocoon and complete its metamorphosis. From them I have bred two species of *Anacharis*—*A. typica*, Walk., and *A. ensifera*, Walk. (Cynipidae).

Rhopalum clavipes, L. (Hym., Sphecidae); sometimes nidificates in the cavities of vacated galls, stocking its nest with Psocidae, Aphidiidae, etc. I have previously reported it from vacated galls of the Longicorn beetle, *Saperda populnea*, L. It is possible that the Chrysidae *Homalus* spp. may have been inquilines in the nests of this species. From a batch of galls containing *Rhopalum* I have bred a Tachinid (? *Oebalia* sp.).

Lissonota errabunda, Holmgr., a Pimpline Ichneumon, has been bred from these galls by S. Wakely, though unfortunately the precise host was not ascertained, probably some sheltering Lepidopterous pupa. The males of this species have been more than once reported on our Field Meetings as seen flying in numbers up and down the trunks of oaks, though no host seems to have been recorded for them. It seems too large to be a parasite of the *Pammene*.

It will be noticed that I have offered no particulars of the oviposition of any of these species, and indeed I have no observations on the point. One might conclude from the length of the ovipositor that *Torymus* and *Megastigmus* attack the galls when already well grown. It is suggested above that *Synergus reinhardi* may attack the galls sometimes when quite small, preventing further growth, yet sometimes it would seem to attack them after full growth has been reached; while *S. melanopus* presumably attacks them only when fully grown.

PHYSIOLOGY OF INSECTS.

By Mr T. R. EAGLES.

Read 11th July 1945.

Much valuable work is done in Entomology without reference to Insect Physiology. Very detailed studies of the external form and even of the internal structure are carried out without any reference to function. Moreover, much useful and interesting observational work on the habits of insects is almost equally devoid of any strictly physiological basis. Yet both would be better for such a background. The student of the differences between species would be more likely to fix on important and stable differences. The patient observer of insect behaviour would be less likely to fall into error when drawing his conclusions. When it becomes a matter of studying insects as enemies of our health, or our crops, or our stores, the importance of knowing just how the organisms work and what outside influences affect them, and how, is very obvious.

It is unnecessary for me to recall to you the general structure of an insect or the position of its organs and I will proceed at once to deal with a few selected aspects of insect function.

The study of the senses of insects is full of lessons against trusting to preconceived notions or jumping to conclusions. We are so accustomed to the idea of sense organs being located in the head that it comes at first as a surprise to find that many butterflies taste a solution to see if it contains sugar by means of the extremities of their feet. This is not an exceptional thing for it is true of important groups of insects belonging to several orders. The sense of hearing is likewise found to be located in curious places, judged by human standards. Species of locusts have elaborate hearing organs located on the two fore legs. *Gryllus*, on the other hand, can hear by means of the filaments at the end of the abdomen. Eyes, on the contrary, are always located on the head and near the brain as with us.

It is not always safe to infer the function of an organ from its appearance. Take as an example the tympanal organ found in the meta-thorax of certain lepidoptera. This has a drum, and in connection with the drum there is a series of pegs designed to excite associated nerve fibres. One would say that it was safe to infer that here is an organ for hearing. But although elaborate tests have shown that the organ is sensitive to air-borne sound nevertheless the experimenters are not satisfied that the normal function is hearing. They think that ordinarily it responds to the vibration set up by the wings, so as to keep the insect informed how its own body is working, rather than to inform it what is happening outside itself.

The numerous bristles and hairs with which the bodies and appendages of insects are beset might excusably be assumed to function by touch. Yet a careful study establishes that, although many are in fact

purely tactile, the bulk of them serve other purposes such as taste, smell, noting temperature, and the detection of air-borne or earth-borne vibrations.

One often hears it said that the behaviour of insects is largely governed by instinct. The word is an unfortunate one to use, because it has been employed in so many different senses as to become almost meaningless. It has, too, a more subtle drawback in that it is commonly accepted as an explanation of phenomena without any thorough-going or scientific enquiry being made. A nearer approach to reality is obtained by analysing the mechanism controlling the behaviour. For example, we notice that some insects "instinctively" sham death when shaken off their food plant. This is brought about by a sort of temporary paralysis of the whole nervous system caused by the sudden loss of contact by the insect's tarsi. It is important to note the widespread effect on the organism of the nerve message from the tarsi. So complete is the response that it is as if the control of the insect resided in the tarsi and not in the brain and ganglions. Such sensitive areas from which nerve messages can pass, causing activity or preventing it, can be proved by experiment to reside in a variety of places. It may be in tactile hairs, so that an insect is restless until it finds a crevice where those hairs establish the necessary contact. Thereupon the nerves associated with these hairs send their message to the brain, which issues the order to cease activity to all the nervous system. The insect then comes to rest. It will do so equally if the crevice is in a fence or tree trunk and provides concealment or if it is between two sheets of glass where the insect draws attention to itself. In other cases the sensitive area may be the halteres, the antennae, the ocelli, or, as would seem to us more natural, the eyes.

It will readily be appreciated that the extreme sensitiveness of one area tends to make insect behaviour so excessively automatic as to be in danger of becoming disadvantageous. The sensitive area has regard to one type of influence only and ignores others. Thus the insect may take evasive action against one danger and do nothing about another. This is an instance of what is often referred to as blind instinct. Thus an insect shamming death would be likely to remain motionless even if it had fallen on some surface where its colour rendered it conspicuous.

Scientists and philosophers have speculated and moralised about the moth's habit of flying round a light. I will state briefly one explanation that has the advantage of a certain amount of support from experiments. The idea of taking one's course from the sun or moon is familiar to all. If we want to steer a straight course through a piece of rough woodland we can do so by so walking that the sun is always at the same side and at about the same angle. Naturally this is true only for a short journey, otherwise the alteration in the apparent position of the sun comes into play. Now it has been proved by experiments that a number of insects find their way in this manner. An ant sets off in a straight line keeping the sun at a certain angle. An ex-

perimeter claps a dark box over it and after two hours removes the box. The ant, so the experimenters declare, resumes its journey keeping the sun still at the same angle. But its course is different because in the two hours the sun has altered its position. The ant's course is bent by the same sized angle as is made by the sun's movement.

It is possible to take the sun or moon as a guide for a short journey in this manner, i.e., keeping it at a constant angle, because of its great distance. If a near light is used you can steer straight towards it or straight away from it. But if you keep a near light at a constant (acute) angle you have to follow a course which circles round it and at the same time gets nearer and nearer to it. This, it is suggested, is just what the moth does. It tries to steer by a near light using the method appropriate to a distant one. If a caterpillar is used in an experiment to see its method of approach its precise course can obviously be better seen than that of a flying insect. Some caterpillars have been found to approach a light by a spiral course.

The rows of spiracles on either side of a caterpillar soon attract the attention of anyone taking an interest in entomology. For the lepidopterist they have an added significance in that their colour and the colour of the rings around them help in the identification of larvae. Thus it is soon learnt that respiration is not through the nostrils as in mammals. Equally readily it is appreciated that in insects there is no regular pumping in of air and pumping out of waste gases. In general, oxygen finds its way in, and carbon dioxide finds its way out, by diffusion. But it must not be assumed that the insect is entirely passive in the matter. It can and does exercise some control. In the first place most forms can close the spiracles, and in addition many can clear spent air from the tracheal tubes by causing these to collapse and then to re-form. But the proportion of the total air in the body that can be renewed in a given time by an insect is only about half the proportion a human being can renew by breathing.

Seeing that so many insects and so very many larvae spend their lives wholly or mainly in the water it is surprising that true gills are not more often met with. When they do occur they are often not the sole or even the main means of securing oxygen. Insects resort to a great variety of other methods. The most primitive perhaps is absorbing oxygen through the skin. In other cases the insects take a supply of air under water with them when they dive, the air being held by special hairs or under the wing cases. Still others tap the air inside the submerged parts of water plants. In passing, it is of interest to note a method whereby the part played by the various organs and body areas of an aquatic insect in respiration can be very neatly estimated. Certain minute protozoa will congregate where there is much traffic in oxygen in preference to other places. Thus, if an aquatic insect be placed in water containing a culture of such protozoa a check can be made on other experiments carried out by the more usual method of removing or putting out of action various organs and areas in succession.

The method of respiration of internal parasites varies a good deal. We ourselves have perhaps never given much thought as to how the ichneumonid or tachinid larva feeding in our prize caterpillar manages to breathe, but others have studied the matter very carefully. Some internal parasitic larvae, especially Tachinids, maintain for a long time a connection with the outer air by means of an opening through the skin of the host. Others tap the tracheal tubes of the larva in which they are living. Others depend on mere diffusion through their skin of air in the bodies of the host. Others have special blood gills for seizing this air.

When we remember the very varying diet of insects and of their larvae it comes as no surprise to find that their digestive arrangements are equally diversified. Contrast the case of a plant-sucking insect of the aphid type with that of a beetle larva boring in dry wood. The former sucks up plant juices and thus takes up its food in extremely dilute solution. To avoid the waste of time and effort involved in passing an enormous volume of liquid through all the departments of its digestive system it has an arrangement whereby at an early stage the surplus water and the undesired portion of the dissolved matter is eliminated and only a manageably concentrated solution of the useful residue allowed to pass on to where the digestive mechanism is ready to deal with it. The surplus liquid by-passes the central portion of the digestive tract and joins up again later to be discharged in the usual way. The problem confronting the wood-boring beetle larva is the converse one of an acute shortage of moisture. It has an apparatus which enables every vestige of liquid to be extracted from each pellet of frass before it is discharged. This liquid is passed back and used again. Incidentally certain dry-feeding larvae are thought to manufacture water from the hydrogen and oxygen in their carbohydrate food. Others seem to eat an excessive quantity of their food and to pass it through little altered except for the extraction of the small modicum of moisture it contains.

Turning to what may be called the small tools of digestion, we find an amazing assemblage. First of all there are the different types of cells belonging to the body of the insect. Their size, shape, and function are most varied, and many of them move from place to place. A description of them would be far too long, but anyone making even a brief study of them will realise that a collection of living cells is more like a labour force of different craftsmen than a mere pile of living bricks. In addition to these cells there are often agents at work that are not part of the insect's body. To this class belong various chemical substances and a host of enzymes—the latter active and potent chemical aggregations seemingly on the borderline between living and non-living matter. Lastly, use is made of other living organisms colonising the insect's body. Some of these internal helpers are plants (bacteria and fungi): others are animals (protozoa). There is no question of the assistance of these organisms being just accidental or casual. It is a system that is

firmly established and of long standing. This is clear from the fact that certain insects cannot live on their ordinary food in the absence of the outside organisms. Moreover, in some cases the body of the insect is modified to meet the requirements of these auxiliary organisms—a special pouch is provided for their reception.

Investigations into the effects of humidity and of heat on insects have to a great extent been the work of economic entomologists and often they have used injurious insects, trying to find out what will kill them. Facts and principles brought to light in this search after methods of destroying insects are of value to those who wish to keep them alive. The harmful effect of excessively dry conditions on eggs, larvae, pupae, and imagines is only too familiar. But a few theoretical considerations will help to drive home the lessons of experience. Take the case of ova. It is not merely a question of dryness causing the shell to become so hard that the young larva cannot make its way out. Lack of moisture delays or stops the processes of development. It also stops certain operations which depend on water pressure. In other words, the supply of hydraulic power is cut off.

For a leaf-eating caterpillar it is well to bear in mind that the percentage by weight of water is in the order of 90%. A reduction to about 60% is generally fatal. These larvae get most of this water from the food they eat. It follows that if a larva has to eat leaves which, though fresh in appearance, have lost part of their water content, its water percentage will fall. Even if this does not kill the larva it may so weaken it that it succumbs at the next moult or when the time comes to pupate. What has been said about the contrivances by which some insects, e.g., wood-boring larvae, resist dessication applies only to those specially adapted to dry conditions. The ordinary lepidopterous larva does not in nature have to face such conditions and so it has only a very limited capacity for coping with them.

Questions of moisture are inseparably bound up with those of temperature because for one thing the amount of water the air can take up varies with the temperature. The consideration of temperature brings us to one of the principal uses made of water. This is the cooling of the insect's body by evaporation just as we can make any part of our body cool by allowing a volatile liquid to evaporate from it. For the insect to use this method it must obviously have an adequate supply of moisture in its body and, moreover, the air surrounding its body must be reasonably dry, as otherwise the water cannot evaporate. Thus, a larva fed on leaves in a closed tin may be faced with a shortage of water inside its body because the leaves are dry and with an excess of moisture in the air around it because the moisture that should be in the leaves is in the air confined in the tin.

The capacity of insects to withstand low temperature is well known. It may therefore come as a surprise to learn that only a few insects can survive complete freezing of the tissues. And these die if the temperature makes a further fall. But it is known that large numbers of in-

sects live through cold winters. Indeed, it is sometimes said that their numbers are greater after a cold winter because the frozen ground protects them from birds and other predators and this gain to them more than makes up for losses due to cold. The explanation of the power to stand low temperatures is, it appears, largely to be found in the fact that the tissues do not freeze because of the phenomenon of supercooling. This property of water is important in many spheres of nature. It is that water under certain conditions can remain liquid although the temperature falls many degrees below zero. It is said that a temperature as low as 50 degrees below zero Centigrade (90 degrees of frost Fahrenheit) can be resisted successfully.

The eye of an insect is a beautiful and fascinating object even when examined without optical aid. With a hand lens it is more so. With each increasing degree of magnification the marvel of it increases, until we realise that each one of the tiny facets making up the visible exterior of the eye is the end of a living telescope of elaborate construction and with complicated moving parts. Nevertheless, it is inferior to the human eye in effectiveness. No surprise need be felt at this because the effectiveness of vision depends on the number of nerve endings. There are many millions of these in a human eye. The distance apart of these nerve endings is about the same as the wave length of light. If the same number of nerve endings were crammed into the much smaller eye of an insect their distance apart would be less than the wave length of light and so most of them would be inoperative.

It is necessary to appreciate that there are two main types of compound eye. One is adapted to the case where there is a full supply of light. Here what is called an apposition image is formed by each facet contributing a small part to a picture made up of a vast number of small parts. For cases where the supply of light is small, as in nocturnal insects, each facet produces the same image. These are superimposed on each other and so the maximum use is made of the light.

The range of insect eyes is thus much greater than that of the human eye when it is a question of the degree of illumination, in compensation for its inferiority to the human eye when it is a question of distance. The insect eye is little, if at all, capable of being focussed and is set for the perception of things near at hand. If it be objected that insects become alarmed all too readily at things comparatively far away the explanation is that their eyes are very sensitive to (a) movement and (b) the intensity of light. In other words, as is well known, one's chances of approaching an insect are greater if one moves very slowly and evenly and at the same time takes care not to cast a shadow. A comparatively large object such as a human being affects equally all the facets of the eye, and so its movement, if slow and even, does not cause much nervous disturbance. But the sudden quick movement of a small object disturbs part of a picture made up of many small parts and is at once perceived. As regards intensity of light, the eye of a diurnal insect uses only a part of the light available and so can function in the

most intense sunlight without any screening. At the other end of the scale, the eye of a nocturnal insect can function in what to us is darkness, by using every ray of the faint light available and multiplying its effect by superimposing on each other as many images as there are facets capable of being brought to bear on the object. It is an arrangement for making use of all the light available that causes the familiar brilliant glow of the eyes of certain nocturnal moths when brought into bright light while their eyes are still adapted to dark conditions. Each unit of the eye has a set of air-filled tubes for reflecting the light. In a bright light this extra aid is not required and a dark sleeve is drawn over it, whereupon the glow disappears. The eye of any particular insect may not have the whole of this great range, but it has a considerable part of it by an arrangement whereby the light passed to the retina by each facet may be increased or diminished.

In some cases the eye can function both for apposition images and for superimposed images.

All larva rearers are familiar with the danger attending the periodical moult. Some of the larvae are often lost however favourable conditions may be. Attempted assistance, even if most carefully and delicately carried out, is generally fatal. Any surprise we may feel at these facts is dispelled by a knowledge of the amazingly intricate processes of moulting. These are far too involved to be described in a short paper, but there is time to refer to an important underlying fact. It is that the operation is carried out by the co-ordinated but yet separate and individual activity of an immense number of cells. In some way the impulse to do a certain thing reaches the vast army of cells. They at once obey and go forward with the work. But once having started they cannot in the ordinary way stop. Thus, if everything goes according to plan all is well, and an elaborate change is brought about with speed and exactitude. On the other hand, in the face of a hitch or difficulty there can be little or no adaptability, and disaster results. On the subject of the complexity of the operations of moulting one matter can be mentioned. The moulting fluid so copiously formed is sometimes assumed to be no more than a lubricant. In fact, its task is to digest and to return to the body of the larva the greater portion of the cast skin, leaving only the outermost layer. This is why a cast larval skin is, apart from hairs, so very thin.

Variation in the outward form of different individuals of one species has long attracted the attention of naturalists. A collection of forms and varieties with data is not only a fascinating display of the power of the forces producing change and progress in animate nature, but can also be a storehouse of information ready for the day when an ecologist or geneticist or other specialised scientist undertakes his investigations. Such investigations have done much to elucidate the probable causes of variation. But where they have done more is in demonstrating the mechanism of variation. It is useful to keep the two things distinct, because the statement of the causes calls for more assistance

from human reasoning than does the observation of mechanism, and is therefore more liable to error. In unravelling the genetical mechanism of variation this Society has taken its share. No doubt in time many of the familiar varietal names will be accompanied by a genetical formula, indicating to the collector how he may rear the variety if he cannot find an example ready made.

Much of the variation observed in nature does not follow Mendelian lines and is not caused by genes. The most familiar of these other causes is temperature. Experiments have shown that temperature is effective during certain periods only in development. They have also shown the nature of the mechanism involved. It seems that during pupal development there are periods during which the details of the wing pattern are laid down. These originating periods follow each other in an orderly sequence. Heat, if applied for a short time only, can affect one part of the chain of processes without altering another. This clearly opens up endless possibilities of variation. Again it has been shown that in some cases wing pattern depends on the timing of two independent processes. Take the case of parallel dark bands. The determining influence of these spreads from the centre of the wing outwards towards the apex and inwards towards the base. At a certain stage the wing scales become ready to receive the colouring and thus the bands are formed. Whether the wings develop quickly or slowly the width apart of the bands remains the same so long as the ratio of the speed of the influences is undisturbed. But if something hastens or slows down one process more than it does the other then the distance apart of the bands will be affected. The host of detailed discoveries that are being made about the method of working of various processes of development may enable us to modify them at will and so produce varieties to order, but their real importance lies in taking us nearer to a true knowledge of underlying principles.

I have touched on a number of matters and my remarks have had to be in a condensed and summarised form. The detailed study of such matters is not the ordinary function of a Society such as ours, but an occasional glance at them is, I think, useful, and I hope, interesting.

A WAR-TIME VISIT TO WEST AFRICA.

By Commander G. W. HARPER, R.N.

Read 12th September 1945.

Opportunities for field work during the war have been few for most of us; and perhaps this fact was even more pronounced in regard to exotic insects. I have therefore plucked up sufficient courage to tell you of a glorious though fleeting experience that befell me in 1941.

I fear I cannot claim to lay before you any new scientific facts; I can only ask your indulgence on the grounds that the impact of the West African lepidoptera on an enthusiastic novice may perhaps entertain you for a few minutes.

Members will recall that, in the dark days of 1940 when this country and the whole civilized world were so desperately near defeat, Mr Winston Churchill made one of the greatest military strategic decisions in all history—to re-inforce the defence of our vital Middle East communications, however great the cost—if necessary at the cost of England herself.

Perhaps the most important items of men and equipment that he sent were fighter aircraft and their personnel for the support of our hard pressed Naval Command of the Eastern Mediterranean Basin. To this end, December 1940 found my ship, a great Aircraft Carrier, loading Hurricanes and their crews in the greatest haste and secrecy at Liverpool. We sailed about the 22nd. Christmas morning at 0830 very nearly saw the end of our operation! The German heavy cruiser, "Admiral Hipper," made contact with the convoy, and could with the exercise of fighting spirit have destroyed it. Had the Captain of the "Hipper" appreciated by how fine a thread—a few Hurricanes—the whole of our fortunes in the war at that moment depended, he might perhaps have been more bold. This incident, I think, provides a splendid example of the value of bold action combined with efficient secrecy.

However, after some ineffective action, "Hipper" retired at high speed to the Westward, and next day we arrived at Gibraltar for fuel.

At that time the enemy denied us command of the Western Mediterranean for vitally important operations such as this. We therefore sailed for the West Coast of Africa, where we were to assemble the Hurricanes on board, and fly them ashore at Takoradi. Thence they would fly by short stages between emergency landing grounds right across equatorial Africa to Khartoum, and from there up to Egypt.

This operation was successfully accomplished; and thus it was that at Freetown, the main port of Sierra Leone Colony, I had at last the opportunity to get ashore and indulge my passion for entomology. My ship called here during the "turn round" for only a few hectic days. Altogether I was able to get ashore on three afternoons only for a period of four hours each, of which about two hours were spent walking into

the hills and returning to the town. Owing to the prevalence of the malarial *Anopheles* mosquito, all leave ended at 1800, or sunset, to my great regret.

The collecting ground therefore that I was able to cover is situated within a radius of about five or six miles, and between east and south of Freetown, the principal port of Sierra Leone, known of old picturesquely as "The White Man's Grave." A few details of the district will not be out of place.

Freetown itself is situated in latitude $8^{\circ} 29' N.$, longitude $13^{\circ} 14' W.$, on the south side of the River Sierra Leone. This is a wide estuary, fed by a number of small streams and studded with mangrove covered islets. The north shore is flat, but the south shore rises quite steeply behind the town to the hills of the Sierra Leone range, where there are peaks of over 2000 feet altitude. These hills are covered with dense primeval bush or forest with strips of cultivation here and there on their slopes.

The climate of the Colony and Protectorate is marked by very distinct wet and dry seasons, but in both the humidity of the air is high, and the climate unhealthy. The dry season extends from November to April, so that when I was there in January it was already well advanced, and the "peak" period for butterflies already past. This is sadly reflected in the condition of many of the insects in the exhibit. The daily temperature range at this time of year is from 74° - 89° F., the humidity 69-76%, and the wind very light. There is, of course, very little actual rainfall, mostly occasional showers, but the cloud averages 4/10 even at this time of year, so that the general effect is that of a "steamy" heat, with very little bright sun, but some bright intervals, fortunately for me, in the afternoon, but also in the early morning. I enjoyed immensely every minute of my only too short stay in the Port—but the wet season, with its 9-10/10 cloud, 40-50 inches of rain a month, must be appalling.

So that you may be able to assess at their true value any observations I am about to make on my experiences, I must frankly confess that, naturally enough, my professional life previous to 1941 had not allowed me much time or facility for reading up the papers and work of distinguished field workers. My lack of knowledge of the state of progress in the field of, for example, Natural Selection was abysmal. On the other hand, I think I may humbly claim to have possessed a fresh and enquiring mind little influenced by second-hand opinions. I have always been greatly interested in the wonderful diversity of means that have been evolved in Lepidoptera for self-preservation—procryptic or aposematic colouration, swift or flaunting flight, varying degrees of edibility or distastefulness, and the behaviour of the insects. To take one homely example—*Smerinthus ocellatus*, L. Everyone knows the beautiful pro-cryptic resemblance of this lovely insect at rest to its environment of dead leaves; alarm it, and, without attempting to take flight, it will swiftly advance the forewings in one movement to "flash" the vividly

coloured hindwings as a "warning" signal. It would be interesting to know the degree of edibility by birds of this moth. My object in this digression is merely to show how great and exciting a stimulus have I found the exotic butterflies that have crossed my path during a good many years of sea service; now that I am enjoying shore service it is possible to read up the splendid work of distinguished entomologists. May I be so bold as to commend to novice members, such as myself, the classic controversy between Sir Guy Marshall and Dr Dixey on the relative merits of the Batesian and Mullerian factors in mimicry. This is recorded in the *Transactions of the Entomological Society of London* for 1908, and many fascinating relevant papers appeared in that and the ensuing decade. I feel sure, now that victory has at last been achieved, we need as many enthusiastic field workers as possible to send in careful observations of insects so as to continue the excellent work of our distinguished predecessors.

May I also add a plea for close co-operation with our colleagues the ornithologists. The degree to which animals, birds, lizards and insects prey upon Lepidoptera can only be determined by much toil in the field. During my few hours in Sierra Leone I kept a special lookout for birds, monkeys and lizards and they seemed to me to be very few indeed.

I only saw one monkey, one bird of a magpie-like species, and a few lizards on the bare stony ground well clear of the forest belt where the most striking mimetic butterflies fly. Similar short visits in the past to South America and the West Indies also lead me to the conclusion that this stimulus to mimicry cannot be very great in these areas; but far more observations by residents in these countries are needed to arrive at a considered view. For example, I would draw your attention to the specimen of *Mylothris primulina*, with a remarkably symmetrical bird bite out of the hindwings. This genus is recognised as distasteful by most authorities.

I will now refer to the exhibit. This consists of Rhopalocera captured during the three consecutive afternoons. Owing to the shortness of time available, I collected entirely at random by walking inland as far as possible in different directions. I must apologize for the low standard of pinning and setting, which was due to the complete lack of materials available to me—you will notice that I had to use ordinary pins for some specimens. The classification and identification I have used is that in Seitz; I thought it better not, in my ignorance, to attempt the more modern conceptions prevailing to-day, except to arrange the insects in the exhibit in the more modern order.

LEPIDOPTERA OF FREETOWN, BRITISH WEST AFRICA.

RHOPALOCERA.

PAPILIONIDAE.

Papilio dardanus, Brown, f. *hippocoon*, F. ♀.

P. menestheus, Drury. ♂.

PIERIDAE.

Pierinae.

Mylothris asphodelus, Btlr. ♂.

M. primulina, Btlr. ♂♂.

Pieris calypso, Drury. ♂.

Teracolinae.

Eronia argia, F., ab. *idotea*, Bdv. ♀.

Coliadinae.

Teria brenda, Dbl. & Hew. ♂.

T. desjardinsi, Bdr. ♂.

DANAIDIDAE.

Danaida chrysippus, L., f. *alcippus*. ♂, ♀.

Amauris niavius, L. ♂, ♀.

SATYRIDAE.

Satyrinae.

Gnophodes parmeno, Dbl. & Hew. ♀.

NYMPHALIDAE.

Charaxidinae.

Charaxes varanes, Cr., f. *vologeses*, Mab. ♂.

C. paphianus, Ward. ♂.

Nymphalinae.

Euphaedra xypete, Hew. ♂, ♀.

E. ceres, F. ♀.

Neptidinae.

Neptis saculava, Bdr., f. *marpessa*, Hpffr. ♂.

Vanessinae.

Hypolimnys missipus, L. ♂.

Precis terea, Drury. ♂.

P. pelarga, F., ab. *harpyia*, F. ♂.

P. clelia, Cr. ♂, ♀.

Acraeinae.

Planema macarista, E. Sharpe. ♂♂, ♀.

Acraea jodutta, F. ♂.

A. terpsichore, L. ♂.

A. zetes, L., f. *menippe*, Drury.

LYCAENIDAE.

Lycaeninae.

Iolaus timon, F.

Cupido isis, Drury.

On first landing at the canteen steps of the port, my eager eyes were greeted at once by the beautiful purple and cream Nymphaline, *Precis cletia*, flitting low over the grass. Passing through the town, I observed a shop with the delightful title outside, "The Sympathetic Undertaker," amusingly appropriate to the "White Man's Grave."

Climbing into the hills through the cultivated outskirts of the town, I remember being forcibly struck with the absence of large butterflies such as *Danaus plexippus* or *Papilio polydamus*, which are such a lovely feature of the West Indian Islands where I have also spent many an interesting "make and mend" collecting. On the other hand, on arriving at the village of Gloucester about 1000 feet altitude, cut into the virgin forest, experiences came quickly. I remember in particular a large black and vivid green *Papilio* dashing swiftly over bushes bordering a stream which persistently defeated me, and so is not represented in the exhibit. Here I must digress from Lepidoptera for a moment to recount a truly poignant memory of a Hymenopteron, a common large black driver ant. I was intently watching and stalking one of the beautiful black and green *Papilios* through the trees, when I was suddenly distracted by the sharpest imaginable pains in many of my tenderest spots!! I should add that I was wearing shorts, a shirt, and boots. Glancing down, I beheld two ants, each a good $\frac{3}{4}$ -inch long, with their very large mandibles buried in the tough leather of my service boots. I will leave the subsequent proceedings to your imagination, only adding that complete dismemberment of each ant was necessary before the agony was abated! I was then able to observe a little more scientifically that I was only a few feet away from the main stream of ants on the march—I had unwittingly encountered the reconnaissance patrols on the flank of the army.

To return to the small village of Gloucester from which I digressed, two more *Precis*, *terea* and *pelarga*, were to be seen flying over the bare ground of the beaten track in a similar way to our Vanessids; the *pelarga* were of the bright blue dry season form peculiar to West Africa. Also in the road I captured the pair of Danaids, *D. chrysippus alcippus*, whilst courting, a beautiful sight. Almost immediately after I saw rising from the side of the road my first *Charaxes varane's vologeses*, a lovely insect of powerful build; whilst flying I at first took it to be an Argynnid! This insect has cryptic form and colour at rest; it is a remarkable "leaf." The other small *Charaxes*, *paphianus*, I captured flying swiftly round some bushes at a lower elevation.

Passing through the village, the cultivated outskirts of the bush contained many fair-sized trees and long grass; in the latter, true to the Meadow Brown and Cabbage White tradition, I took the Satyrid, *Gnophodes parmeno*, and some "whites" of the beautiful genus *Mylothris*—I would draw attention to the lovely satin texture of the scaling, and the delicate colouring. This group is very variable and difficult to identify without expert advice. Flying in company with the *Mylothris* and in the same heavy manner, I captured a moth which mimics *asphodelus*

perfectly—I have placed it in the exhibit next to the butterfly. In flight the resemblance is of course more marked. Here I also was fortunate to take a specimen of the Teracolid, *Eronia argia*, ab. *idotea*—an insect of very powerful flight which careers over and round the bushes at a tremendous rate; our clouded yellows are snails in comparison! In the same clearing I also took the only Pierine I saw in West Africa, *Pieris calypso*. Two small *Teria*, *brenda* and *desjardinsi*, I took much nearer to Freetown itself on dry grassy ground at about 500 feet elevation.

In the sunny clearing among the trees nearby I suddenly saw a huge creamy white butterfly dashing swiftly about, which was clearly a *Papilio*, although at the time I knew of none of that colour. Fortunately, the sun then became obscured; the insect settled pendulously under the upper frond of a plant, and I was able to take it, a fine ♂ *Papilio dardanus*. I was not at the time aware that this species is a classic example of sexual polymorphism, the females being entirely unlike the males in appearance and wing contour. They have lost their tails in the course of their evolution, and the several forms bear such striking resemblance to Danaids that they are used to support the mimetic theories. All I can say is that on examining my captures later I was delighted and astonished to find I had taken a female *dardanus*, f. *hippocoon*, which “mimics” the Danaid, *Amauris niavius*, so well that I had at the time been completely deceived into thinking it an aberrant *niavius*. Examination of the neururation soon dispelled my error, of course. I took this insect, and the ♂ ♀ *niavius* on the same afternoon flying in company in entirely different surroundings from those where I took the male *dardanus*. They were flying well inside the dark and gloomy forest among big trees at a lower altitude. To those who are interested in the Batesian and Mullerian mimetic theories, I might here perhaps make four points from my very limited observations on these two species:—

- (1) The flight of *P. dardanus hippocoon* is almost identical with that of *A. niavius*—leisured and flapping—entirely unlike that of her mate.
- (2) The habitat of *hippocoon* is that of *niavius*—the two sexes perhaps meet for pairing on the edge of the forest.
- (3) Both species are probably equally common in this locality; the mimetic factor is therefore more likely to be Batesian than Mullerian.
- (4) It is generally assumed that distasteful models have aposematic or warning colouration which they display to their enemies by a slow flapping flight. I am not happy about this; *niavius* and *hippocoon* in their habitat are not conspicuous; the black and white pattern breaks up the outline, as in the case of our own *Papilio machaon*.

Amauris niavius is a splendid insect in spite of its sombre black and white garb. It is by no means easy to capture as it floats and flaps along

under the big trees, tending as it does so to go high and out of reach. The males are easily distinguished from their mates by the patch of scent scales on the hindwings, easily visible when viewed against the light. I wish I had seen the courting of this great insect, and the interesting way in which the male distributes the scent by "brushing" the patches with his anal tuft. I have, however, watched our own *P. megaera* ♂ rubbing his androconia on the antennae tips of the female—an interesting variation on the theme.

In a sunlit water-course I took the great *Papilio menestheus*—an exciting capture. Its flight was the typical sweeping flight of the swallow-tail.

Flying with tremendous swiftness along some of the tracks through and on the outskirts of the "bush" were the great Nymphalines of the difficult genus *Euphaedra*—I took with much toil and sweat two very worn species, *xypete* and *ceres*, I think. The only other large Nymphaline I came across was, I think, *Hypolimnus missipus*, a male. I was not successful in locating a female, which I believe also "mimics" a Danaid; but I noticed that, in spite of the beautiful purple iridescence of the wings, the general effect of this insect was also black and white, and I took it in shady ground beneath trees.

Another Nymphaline was the little *Neptis suclava*, f. *marpessa*. It has a floating flight.

I now come to the interesting African Sub-family *Acraeinae*, of which I was able to sample two genera and four species. Like the members of *Euphaedra*, these are many and varied, and are difficult for the novice. The *Planema* exhibited are, I think, probably one species only, *P. macarista*, but the female may perhaps be *P. camerunica*. Like the *Papilio dardanus*, there is distinct sexual dimorphism, the female conforming to the black and white deep forest colouration, perhaps mimetically associated in the Mullerian manner with the *Amauris niavius* group. At any rate, I captured my female in the latter's company, while the males I took outside the forest proper. The latter were flying in company with the *Acraea* species exhibited, *jodutta*, *terpsichore*, and *zetes*. The latter insect I am particularly doubtful about; it is a strikingly coloured creature, and is the only species illustrated and described in Seitz that it remotely resembles. These creatures all exhibit the characteristic tough integument of so many distasteful species—I experienced great difficulty in killing them. I wish I could tell you that I had observed the pairing of the *Planema* and *Acraea* in the hope of throwing more light on the remarkable "Sphragis," the secretion which has been stated to be necessary in order to protect the female from unwelcome male attentions subsequent to pairing. I feel a little doubtful about this theory, for most butterflies of the female sex, in my experience, are by no means averse from masculine attention at any period in their imaginal life. I believe that *Parnassius apollo* females also develop this curious structure during pairing, and am not aware that a satisfactory explanation has ever been offered.

The Sphragis is excellently described in Dr E. Eltringham's famous Monograph on the genus *Acraea*, in Part V of the 1912 *Transactions of the Entomological Society*. Briefly it consists of a large mass of waxy material secreted by the male, and mixed with hairs and scales from his abdomen. This hardens upon the under-surface of the abdomen of the female after copulation has been completed. That the Sphragis is by no means always effective in preventing subsequent pairings has been indicated by Sir Guy Marshall, who has captured female *Acraeas* with two distorted seals present. He has observed the pairing of these species, which is most forceful.

I have left to the last any mention of that fascinating family, the Lycaenidae, simply because I personally only came across them on two occasions. The large and beautiful *Iolaus timon* I captured as it fluttered breast high between two bushes in the shady edge of the forest. It is possible she was intent on oviposition, but at the time I could not determine her sex, so missed the opportunity of observing her. To those who are not familiar with this insect, I would point out that the specimen shown has lost both of its long "tails;" these are about two centimetres long, and depend from the anal angle of each hindwing. I imagine they cannot remain intact long after emergence. The other Lycaenid I found was the pretty little *Cupido isis*. The insect exhibited differs from the illustration and description in Seitz in that there is no white median spot on the forewing. A swarm of these little butterflies was frequenting a small water hole in the bend of a track not far from the town, and they were uncommonly active on the wing, dispersing rapidly in all directions when I attacked!!!

Finally, you will observe that my brief encounter with the West African Rhopalocera has left me with only one family entirely unrepresented—the Hesperidae. Not a "Skipper" did I see!

Next morning my ship and her escort sailed for the cold grey northern regions, and the different realities of the U-boat and the night bomber. Such vivid contrasts are perhaps the source of the age-old appeal of the sea that has made us the greatest sea-faring nation of the world. May I conclude by hoping that my description of one such episode has been of some interest.

SOME NOTES ON THE OVA OF THE HEMIPTERON, PENTATOMA RUFIPES, L.

By E. J. BUNNETT, M.A.

Read 10th October 1945.

Ova of the plant-bug, *Pentatoma (Tropicoris) rufipes*, L. (Fig. 1), sent me from the S.E. Agricultural College, Wye, by Mr J. Sankey afforded some curious features which, as far as I know, have not been elsewhere recorded, in which case these observations may perhaps be found noteworthy. [For a brief description see Butler, E. A., *Biology: British Hemiptera-Heteroptera*, page 60. K.G.B.]

This insect, it appears, has recently infested cherry orchards near Sittingbourne, Kent, in particular, to the detriment of the cherry crop and, owing to the very disagreeable odour of the bug, to the disgust of the pickers, to whom they are known as "bishops." Before hatching, two reddish spots and a short black line give the appearance of a little goblin face to each of the spherical opaline ova, the red spots being actually the eyes of the enclosed larva (Fig. 2).

On the 27th August the eggs of one batch hatched out, and the remainder on the following day.

The little "bishops" (which Mr Sankey tells me are facetiously called "minor canons" at his Research Station) on emergence huddled together around the egg-shells. I offered hawthorn leaves for their food and on this they thrived satisfactorily, quickly increasing in size. After the first ecdysis, the insect being a very common one and my concern being only with the eggs, I made no further notes upon its life history.

In order to extract and examine the black line above mentioned, the egg was crushed between two glass microscope slips. The pressure necessary to rupture it was so surprising that I was curious to ascertain what weight could be withstood by the egg before it collapsed. To prevent it from slipping out from between the glass slides, an egg was anchored in position by two or three strands of cotton wool wetted with a drop of water. I then placed on the upper slip a series of weights beginning with one ounce which was replaced by one of four ounces and that by eight ounces without result. The weights were then successively increased by two ounces at a time until the extraordinary total of twenty ounces was supported without rupturing the shell, and it was not until a weight of twenty-four ounces was applied that the egg burst. From the exuded contents it was easy to detach the little black object mentioned and mount it for microscopical examination.

It was then seen to be a chitinous apparatus in the shape of a laterally compressed mushroom (Fig. 5). We may tentatively call it the egg-breaker. The toughness of the egg shell which offers so great resist-

ance to pressure points to the apparent need of a cutting tool, or some such mechanism for breaking open the egg. Muscular fibres attached diametrically to each side of the "pileus" tending towards the "stipe" may be for the purpose of enabling the arc to move backwards and forwards in its own plane, as a cutting or forcing edge, but there are no teeth as in the egg-breaker of *Stenopsocus* (*Psocoptera*) for instance.

This supposition is strengthened by the fact that the egg-breakers left in the empty shells are invariably on the line of fissure between the cap and the rest of the shell (Fig. 4). Whether the removal of the cap is effected by the extremity of the "stipe" or by the mucronate bulge in the centre of the "pileus" remains to be elucidated.

A somewhat elaborate appendage is attached to the pileus (Figs. 9 and 10). This organ appears in the empty shell as a white stripe running across the cap (Fig. 3). It is apparently a muscular organ.

On that portion of it nearest the "pileus" there are some loops or notches shaped and perforated like nutmeg-graters. The concave surface of the "pileus" appears to be fibrous, almost in the form of matted hairs.

The egg-breaker fits closely over the back of the head of the larva in the egg (Fig. 8). It becomes detached when the larva has hatched out, and it adheres to the interior of the shell together with its appendages (Fig. 4). I make no attempt at present to explain how this remarkable instrument is used in opening the egg, but it is undoubtedly used in some way to effect the exit of the larva.

In the empty egg-shells (Fig. 3) a series of dots, in number seventeen or eighteen, are conspicuous along the circumference of a circle on the "cap" portion running parallel with and very close to the line where the "cap" is cut off from the rest of the egg.

A more minute examination of a number of micro-mounts of empty eggs showed that every dot is actually a kind of peg passing through a ringed aperture in the shell (Figs. 6 and 7). The peg, which appears to be solid, is in the shape of an elongated wine-glass, standing perpendicularly to the interior surface of the egg with the small circular foot of the wine-glass projecting outside, through the ring. It is very probable that the pegs assist in some way in the rupturing of the egg, perhaps by acting as guides for the sweep of the egg-breaker.

In the empty egg shells of another plant bug (*Stollia fabricii*, Kirk.) the extremities of the pegs can be more plainly seen protruding *outside* the shells (Fig. 11).

Not having had opportunity to see the so-called egg-breaker in operation, I have regretfully to leave further investigation into its proper function, and that of its curious appendages, until a further supply of eggs is obtainable.

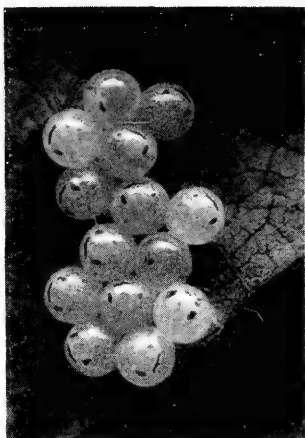
Meanwhile I hope my photographs and these scanty notes may be of assistance to others, as well as myself, towards solving this interesting problem.

EXPLANATION OF PLATES.

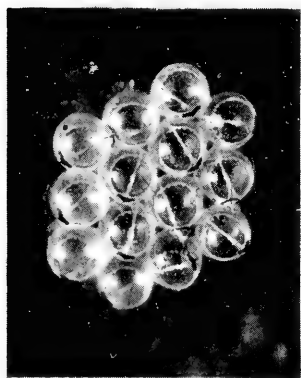
- Fig. 1. The perfect insect. *Pentatoma rufipes*, L. $\times 1$.
Fig. 2. Eggs before hatching. $\times 5$.
Fig. 3. Empty egg shells. $\times 5$.
Fig. 4. Egg showing position of egg-breaker. $\times 25$.
Fig. 5. The egg-breaker. $\times 90$.
Fig. 6. Egg-cap, split by flattening. $\times 40$.
Fig. 7. Marginal portion of egg-cap. $\times 120$.
Fig. 8. Larva in egg. $\times 25$.
Figs. 9 and 10. Egg-breaker and appendages. $\times 60$.
Fig. 11. Ova of *Stollia fabricii*, Kirk. $\times 10$.



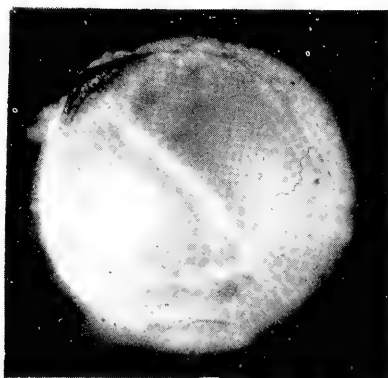
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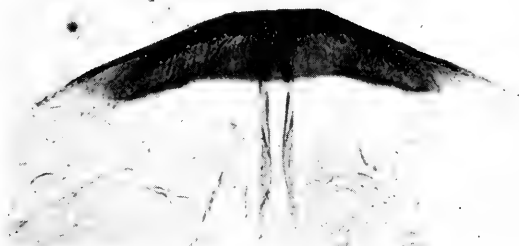
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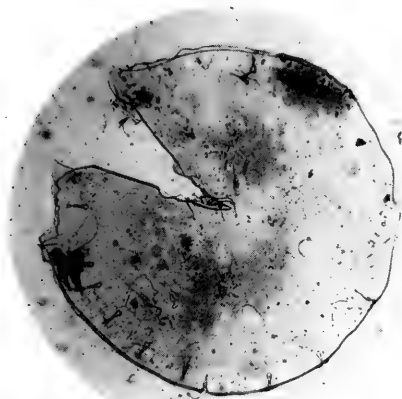


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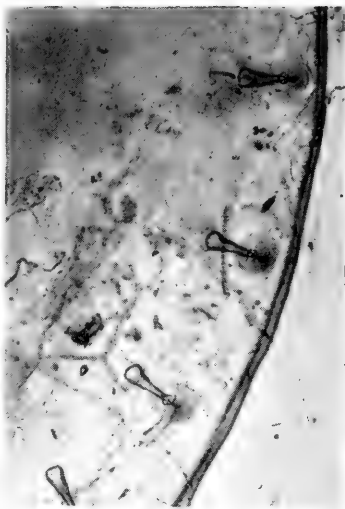


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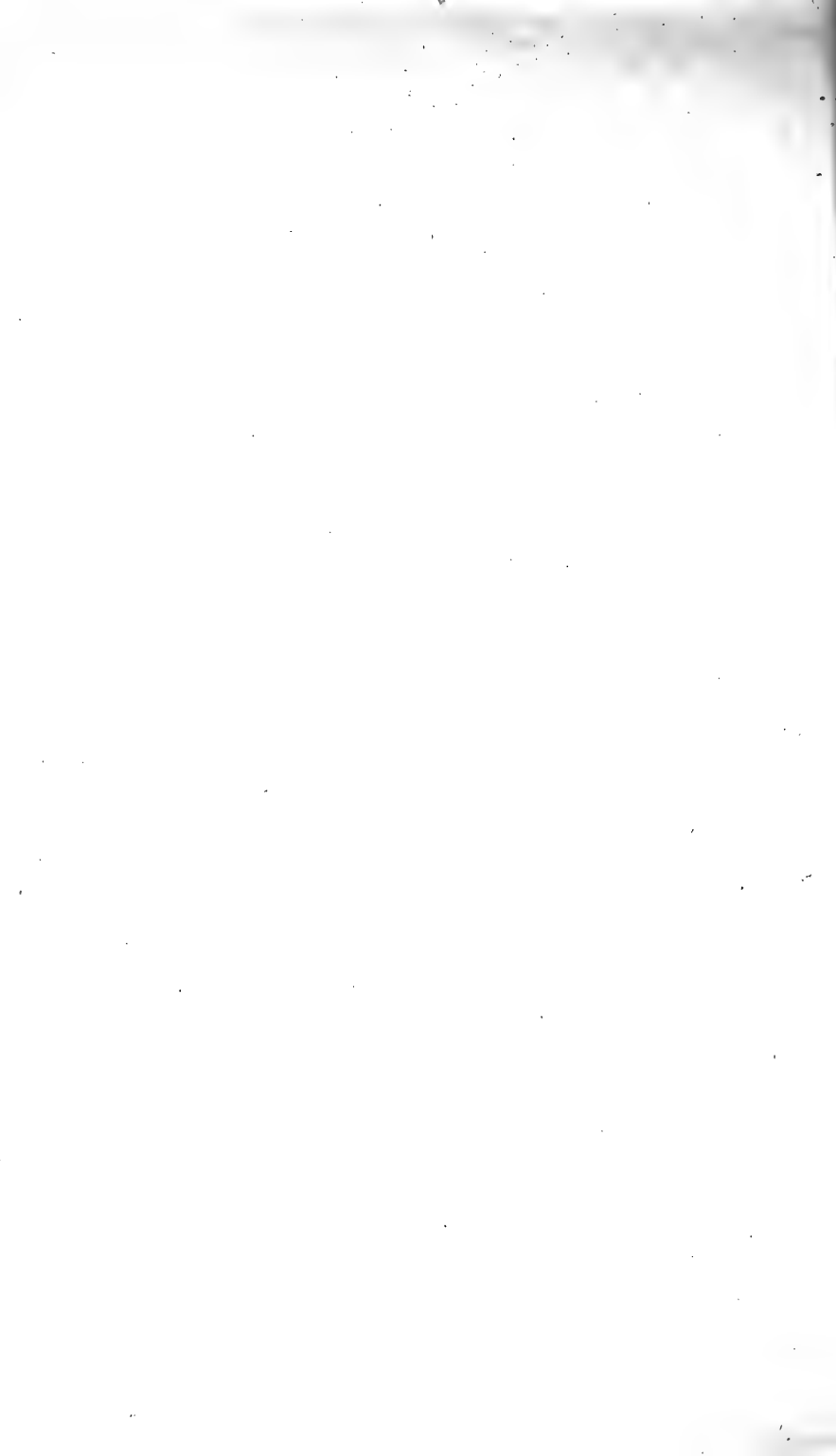
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THE PSYCHIDAE.

By L. T. FORD.

Read 7th November 1945.

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The position of the Psychidae amongst the Lepidoptera has been frequently discussed by many authors and affinities with widely different families have been suggested from time to time. These are reviewed very completely by Tutt in his *British Lepidoptera*, Vol. II, p. 117, and following pages and are shortly summarised by Burrows in his paper on the Psychidae in the *Ent. Rec.*, Vol. 36, p. 81 (1924). There can be no doubt, however, that the Psychidae constitute a superfamily having no close relation to other lepidoptera from which they branched off in very early times.

Amongst the characters which distinguish the Psychidae are the obsolete or rudimentary tongue and maxillary palpi; the apterous females (except *Narycia* and *Diplodoma*); the habit of the larvae of living in portable cases, their undeveloped anal prolegs and highly developed third pair of true legs, and the anal hooks of the pupae.

The Psychidae fall into two groups which have been termed the Macro-Psychina and the Micro-Psychina. The former are separated from the latter by the absence of nervure 8 from the forewings and the strongly developed nervure 1c; by the absence of the secondary cell at the apex of the discoidal cell of the forewings, which appears in all the Micro-Psychina; the antennae bipectinated to the apex; the habit of the larvae of attaching fragments of vegetable matter to their portable cases; the pupa skin of the male only being protruded on emergence; the female on emergence remaining in the larval case and after fertilisation laying ova in the pupal skin, and by the ventral position of the two anal hooks of the pupa which in the Micro-Psychina are on the dorsum. Some of these characters overlap, e.g., the female of *Fumea casta*, Pall. leaves the case on emergence and amongst the Micro-Psychina the pupa skins of the females of *Luffia lapidella*, Göze, and *L. sepium*, Spey, remain in the larval case and the ova are laid in the pupa skin; the antennae of the two latter species are shortly bipectinated. The forewings of the Macro-Psychina are rounded; in the Micro-Psychina the apex is more or less pointed.

The Psychidae are sparsely represented in this country but are more numerous in warmer climates. In general the wings of the males have no prominent markings, being for the most part unicolorous but some species have a slight reticulation of a darker colour and some have irregular markings of a lighter colour. The wing membrane of most species is very thin, rendering the wings very delicate, but in spite of this the imagines fly strongly, for the most part in sunshine. The females of all British species, with the exception of *Narycia monilifera*, Geoffroy, and *Diplodoma marginepunctella*, Steph., are apterous. They

are curious insects; devoid of scales and some have no legs or antennae and on emergence do not leave the larval case; some have corneous plates on the head and thoracic segments, and some have a more or less developed anal tuft of hairs.

The larvae of all species inhabit portable cases which are made of silk and are very strong and tough. The larvae of the Macro-Psychina attach to the outside of the case fragments of stick, grass or other vegetable substance. The cases of some foreign species are complicated structures and these have led to the name "Basket-worms" for the larvae. The cases of the Micro-Psychina are usually covered with lichen or tree algae and the colour of the case varies somewhat according to the lichen on which the larva has fed. The case of each species is characteristic but those which have fragments of vegetable matter attached vary according to the material available to the larvae.

The larvae of all species pupate in the larval case. The anterior end of the case is affixed for pupation and after fixing the case the larva turns round and the imago emerges from the posterior end of the case. The pupa of the male is protruded from the case on emergence and in the Micro-Psychina the pupa of the female is also protruded with the exception of *L. lapidella* and *L. sepium* already mentioned. The females of the Macro-Psychina (except *F. casta*) remain in the case.

The ova of the Macro-Psychina and of *L. lapidella* and *L. sepium* are laid in the pupa skin. The other species of the Micro-Psychina lay their ova in the larval case, inserting the ovipositor between the pupa skin and the side of the case. The larvae on hatching immediately construct cases, usually with material obtained from the case from which they have emerged. A case of *F. casta* clustered with the minute cases of the newly hatched larvae may often be seen on a fence or tree trunk towards the end of July.

A characteristic of the Psychidae is the phenomenon of parthenogenesis. In lepidoptera generally parthenogenesis is of unusual occurrence. In the Psychidae it is, with some species, the rule rather than the exception. In most species the females greatly outnumber the males.

There are 17 or 18 British species excluding those forms the specific status of which is doubtful. The Macro-Psychina include the following species:—

1. *PACHYTHELIA VILLOSELLA*, Ochs. Male with the antennae bipectinated to the apex. Forewings have nervure 8 absent, 1b and 1c connected by a bar, nervures 7 and 9 stalked; hindwings with nervure 6 absent. Wing expanse 27-28 mm. Forewings and hindwings are thinly scaled with hair scales dark brown in colour. Head and thorax are slightly paler, hairy. The female has no legs or antennae.

The case is a silken tube 30-35 mm. in length and 8-10 mm. in diameter, covered with bits of heather twigs and grass stems. The male larva shortly before pupation lengthens the silken tube at the posterior end of the case without attaching any fragments thereto and this prolongation firmly holds the abdominal segments of the pupa on emergence.

The larva feeds on *Calluna*, *Erica* and grass, and possibly other plants, from July until May of the second or third year. Those larvae which attach the case for pupation on tree trunks or posts have, in my experience, only produced females. I have only found cases of the male affixed for pupation on heather. The moth appears in June and is generally distributed in the heathy districts of Hants and Dorset.

2. *P. OPACELLA*, H.S. Male with the antennae bipectinated to the apex. Wing expanse 19-22 mm. Forewings and hindwings very thinly scaled with hair scales, grey. Head and thorax paler in colour, hairy. The female has no legs or antennae.

The case is about 20 mm. in length and 5-6 mm. in width and except for its smaller size is similar to the case of the preceding species.

The larva feeds on grass and possibly other plants from August to April. The moth appears in May and June. This species is more widely distributed than *P. villosella* and although local occurs as far north as Sutherland.

3. *STERRHOPTERYX HIRSUTELLA*, Hb. Male with the antennae bipectinated to the apex. Forewings have nervure 8 absent, 1b and 1c connected by a bar, nervures 4 and 5 stalked, and 9 and 10 also stalked. Wing expanse 18-25 mm. Forewings and hindwings very thinly scaled with hair scales, grey in colour. Head and thorax paler, hairy. The female has no legs or antennae.

The case is somewhat conical in shape but narrowed at both ends, the posterior end being the more pointed. It is 18-20 mm. long and 7-8 mm. in width at the widest point and is covered with bits of heather and vegetable fragments irregularly fixed.

The larva feeds on *Calluna*, *Erica*, birch, willow, etc., from August until May of the second year. I found a number of cases of this species at Witherslack affixed for pupation on the upper side of leaves of small birch trees but all were parasitised by an ichneumon. [Seven species of Ichneumonidae recorded by Morley and Rait-Smith, *Trans. Royal Ent. Soc.*, 1933: 173.—Ed.] The only male specimen which I obtained emerged from a case affixed to heather.

The moth appears in June and July and comes to light. It occurs as far north as Perth but is very local.

4. *WHITTLEIA RETICELLA*, Newm. Male with the antennae bipectinated to the apex. Forewings have nervures 8 and 10 absent. Hindwings have nervure 4 absent. Wing expanse 9-11 mm. Forewings and hindwings thinly scaled with hair scales, whitish with irregular transverse markings, the crossing of which by the nervures give the wings a chequered appearance. Head and thorax hairy, pale grey. The female has no legs or antennae.

The case is 8-10 mm. long and is covered with longitudinally placed thin fragments of grass, some of which project posteriorly beyond the silken tube.

The larva feeds from August until April on various grasses growing on salt marshes, apparently preferring the fine leaved grass which grows in patches. The moth appears towards the end of May and in early June and is moderately common on the salt marshes of Kent, Sussex, Hants, Essex, and Suffolk.

5. *EPICHOPTERYX PULLA*, Esp. Male with the antennae bipectinated to the apex. Forewings have nervure 8 absent; hindwings have nervure 4 absent. Wing expanse 11-16 mm. Forewings and hindwings are thickly scaled with hair scales and black in colour. Head and thorax hairy, black. The female has no legs or antennae.

The case is 9-15 mm. long and is covered with longitudinally placed bits of grass, some of which project posteriorly beyond the silken tube. The grass fragments are constricted towards the posterior end of the case.

The moth appears towards the end of May and in early June and sometimes the males may be seen flying over the grass in meadows and roadside wastes in large numbers in sunshine in the middle hours of the day. This species occurs locally in the southern counties.

6. *FUMEA CASTA*, Pallas. Male with the antennae bipectinated to the apex. Forewings have nervure 8 absent; hindwings have nervure 4 absent. Wing expanse 9-15 mm. All wings are black-brown in colour with a faint purple gloss, the forewings being the more glossy. Head and thorax hairy, black-brown. The female has legs and antennae and a yellowish-white anal tuft.

The case is 10-12 mm. long and is covered with longitudinally placed bits of grass, some of which project beyond the silken tube, and are splayed outwardly at the posterior end. They may sometimes be seen in large numbers affixed to fences, posts and tree trunks. The larva feeds on grasses from the end of July until May. The moth appears towards the end of June and in July and occurs commonly as far north as the Clyde.

F. scotica, *F. hibernicella*, and *F. mitfordella* described by Chapman are, according to Meyrick (*Revised Handbook of British Lepidoptera*), forms of *F. casta* and are not specifically distinct. *F. scotica* is larger than the average *F. casta* and the male antennae have from 18-20 joints. *F. casta* having from 16-20. *F. scotica* was taken by Chapman at Rannoch and in Sutherland (*Proc. Ent. Soc.*, London, 1899, p. xxvi).

7. *F. CRASSIORELLA*, Bruand. Wing expanse 13-17 mm. Forewings and hindwings are dark brown or fuscous with a slight bronzy-purple gloss, the forewings and cilia being the more glossy. The female has legs and antennae and anal tuft of hairs grey-whitish mixed with brown.

The case is 9-12 mm. long, covered with fragments of grass four or five of which project beyond the silken tube. It is similar to the case of *F. casta* but stouter compared with its length. The larva feeds on grasses from August until May and the moth appears in June and July. It is very local and occurs only in the southern counties.

8. *PROUTIA BETULINA*, Zell. Male with antennae bipectinated to the apex. Forewings with nervure 8 absent, median nervure in the cell furcate; hindwings with nervure 4 absent. Wing expanse 12-13 mm. All wings are a uniform brown, slightly glossy, the forewings being the more glossy. Head and thorax are dark brown. The female has legs and antennae and a white anal tuft of hairs.

The case is about 8 mm. long and 3 mm. in width, slightly pointed and covered with small fragments of lichen and bark with an occasional larger fragment. The larva feeds from August until May on lichens, apparently preferring the lichens growing on bushes. In captivity the larvae will eat leaves of sloe and hawthorn and catkins of birch and willow. The moth appears in late June and July and has been recorded from localities in Essex, Middlesex, and Surrey.

9. *P. EPPINGELLA*, Tutt. This species is similar to the preceding but has the forewings spattered with rather large black scales and the male antennae have 26 joints whereas *P. betulina* has 21 joints. The case also is similar but has more larger fragments attached. The larva feeds on lichens growing on tree trunks from August until May. The moth appears in July and the only definite records are from Epping Forest. Other records are perhaps referable to *P. betulina*.

The Micro-Psychina include the following species:—

10. *NARYCIA MONILIFERA*, Geoffroy (*melanella*, Haw.). The antennae are yellowish-white ringed with black. Wing expanse 9-11 mm. The forewings are black with scattered whitish to yellowish spots which form an irregular fascia before and beyond the middle of the wing. The head and thorax are black and rough haired. The female is similar to the male.

The case is 5-6 mm. long and 2 mm. in width, nearly triangular and black in colour, but with a dusting of lichen powder giving it a greyish-green appearance. The colour varies somewhat according to the lichen on which the larva has fed. The cases are not easy to find amongst the lichen but when the larva is full fed towards the end of May it often affixes its case to part of the tree or fence which is not covered with lichen and is then easy to see. The larva feeds from March to early June on the powdery lichens growing on trees and fences. The moth appears from the end of May to the middle of July and is moderately common in England but scarcer in the northern counties.

11. *DIPLODOMA MARGINEPUNCTELLA*, Steph. (*herminata*, Tutt). The antennae are shortly ciliated. Wing expanse 11-13 mm. The forewings are dark brown with a faint purple tinge, scattered with yellow-white dots and strigulae. On the dorsum just before the middle of the wing is a nearly square spot of the same colour. The hindwings are dark grey to black. The female is similar to the male but has a large anal tuft of hairs. The head is rough haired and ochreous in colour.

The larva makes a double case, the inner one 10-11 mm. long, the outer one a little shorter, 4-5 mm. in width. The case is tapered at both

ends, the posterior end being the more pointed. The outer case is covered with small fragments of vegetable matter and sometimes with pieces of beetle wing. It is ochreous-grey in colour speckled with the darker coloured bits of material attached to it.

The larva feeds from August until June of the second or third year on decaying leaves, fungus, lichen, dead insects and the close-growing moss found on rotten sticks and undergrowth stumps. Some larvae which I reared completely devoured a large female *Saturnia pavonia*, L. (*carpini*, Schiff.) although they had plenty of other food available. The cases are best found in April and May by searching round the base of undergrowth stumps. They are seldom more than an inch above the ground level, although when full fed a larva will sometimes ascend higher to attach its case for pupation.

The moth appears in June and July, emerging in the early morning and flying towards dusk. It occurs locally in Britain as far north as Sutherland.

12. *SOLENOBIA INCONSPICUELLA*, Staint. Male with the antennae shortly ciliated. Forewings with nervure 10 absent, 1b furcate. Wing expanse 9-13 mm. Forewings are grey with scattered irregular undefined darker spots, larger and more defined on the termen. Hindwings light grey. The female has legs and antennae and the wings are represented by short filaments. The anal tuft of hairs is white mixed with grey.

The case is 5-6 mm. long and about 1.4 mm. in width, subtriangular, nearly black in colour but more or less powdered with grey-green lichen.

The larva feeds from June to March on lichens growing on trees, fences and rocks and when full fed usually seeks out some crevice in which to affix its case for pupation. The moth appears towards the end of March and in April and occurs throughout England locally.

A parthenogenetic form of this species occurs and sometimes the cases of this form can be found in large numbers. So far I have only found the larvae of this form feeding on lichens growing on rocks and walls.

13. *S. LICHENELLA*, L. No male of this species has been recorded from this country, the parthenogenetic form only being found.

The case is 8-9 mm. long and 2.5 mm. in width, triangular in section and tapered at both ends. It is grey to ochreous in colour and is covered with very small fragments of soil and sand. The larva probably feeds on decaying vegetable matter on the ground and only ascends tree trunks and fences for the purpose of pupating. The female has legs and antennae and the wings are represented by short filaments. The anal tuft of hairs is white. The moth appears in April and May and occurs locally in the southern counties.

Meyrick considered *S. lichenella* to be only a form of *S. inconspicueLLa*. The case of the former is considerably larger than that of *S. inconspicueLLa*; the female also is larger. The cases of both occur in the same spot in Bexley.

14. *BANKESIA DOUGLASI*, Staint. A single specimen taken by the late Mr Douglas at Birch Wood, Kent, a locality now destroyed. The specimen is in the South Kensington Museum and is described by Meyrick as follows:—"13 mm. Head greyish-fuscos. Forewings greyish-fuscos, numerous irregular rather well-defined whitish spots between veins; a darker irregular transverse stria anteriorly and one or two towards apex; a small darker median dorsal spot, preceded by a pale spot; cilia distinctly barred. Hindwings pale grey."

15. *B. STANTONI*, Wals. (*conspurcatella*, Staint.). The antennae of the male are distinctly ciliated. All nervures present. Wing expanse 11-13 mm. Forewings pale ochreous with scattered small fuscous spots giving the wings a reticulated appearance; four or five larger spots on the costa towards the apex and one in the middle of the dorsum. The hindwings are grey. The female is apterous, with legs and a greyish anal tuft.

The case is 6-8 mm. long and about 2.75 mm. in width, triangular in section, covered with sand and lichen powder. The larva feeds from May to September on the powdery lichens growing on tree trunks and fences. The moth appears in March and has only been found in this country on the east side of Southampton Water.

16. *TALAEPORIA TUBULOSA*, Retzius (*pseudobombycella*, Hübn.). The male has the antennae shortly ciliated. All nervures present. Forewings with nervure 1b furcate, 7 and 8 stalked. Wing expanse 15-18 mm. Forewings are brown with numerous undefined pale spots between the nervures giving the wings a reticulated appearance. The hindwings are dark grey. The female is apterous, brown with a grey-whitish anal tuft of hairs.

The case is 17-19 mm. long and 2 mm. in diameter, nearly triangular in section, pale brown in colour with minute fragments of some darker material attached.

The larva feeds from July until April on decaying vegetable matter and lichens on the ground. It is also said to feed on dead insects. At the end of May or in early June it ascends a tree or fence some three or four feet to affix its case for pupation. The moth appears in the latter half of June and is moderately common throughout England.

17. *LUFFIA LAPIDELLA*, Göze. The male antennae are shortly bipectinated. Forewings with nervure 9 absent, 1b furcate. Hindwings nervure 5 absent. Wing expanse 9-12 mm. The forewings are grey with a slightly darker reticulation; hindwings light grey. In the female the wings are represented by short filaments; the anal tuft is yellowish-white.

The case is conical in shape, 5-7 mm. long and 2-3 mm. in width at the anterior end. It is covered with minute bits of lichen, parti-coloured, grey and dark greyish-green, varying somewhat with the colour of the lichen on which the larva has fed.

The larva feeds from August until May on the powdery lichen growing on rocks, tree trunks and fences.

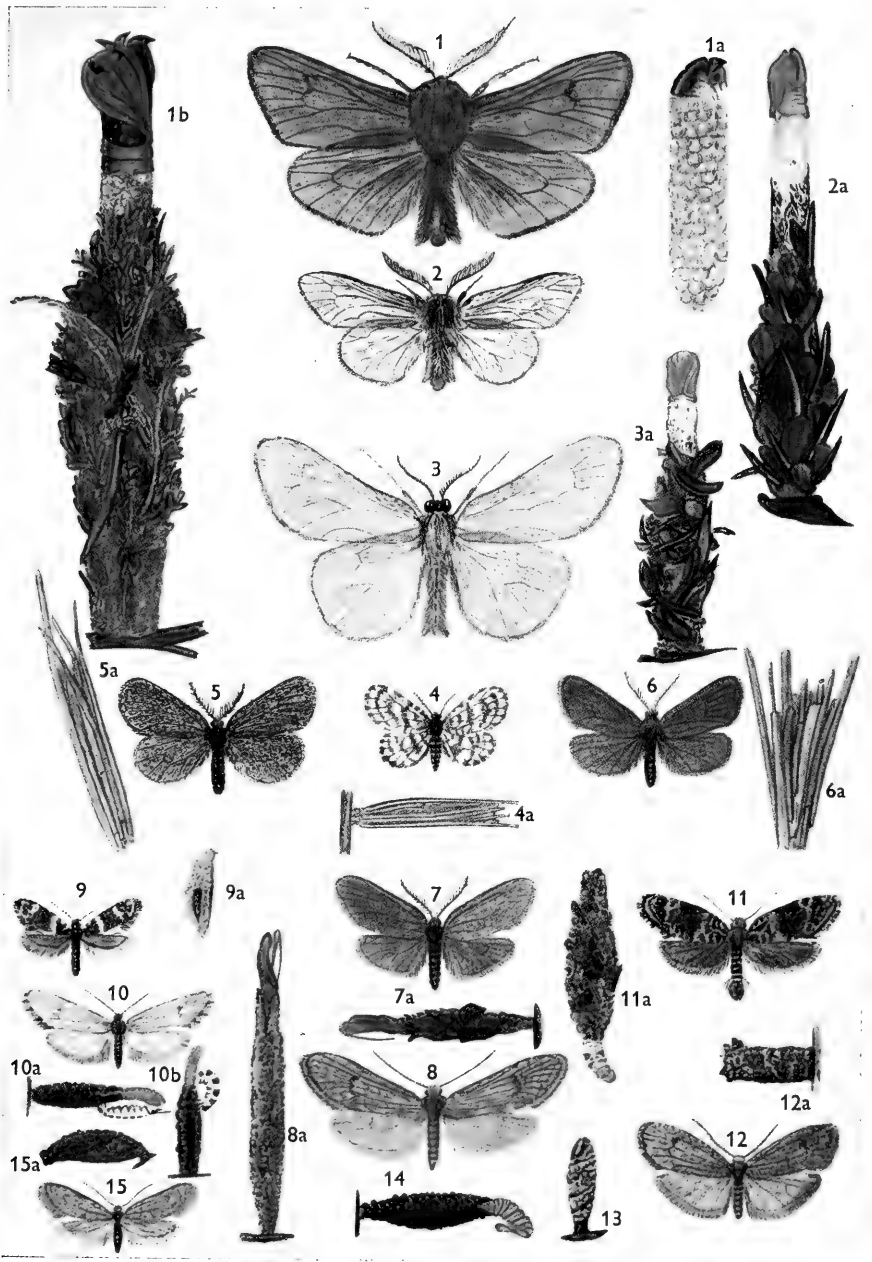
Apparently the only authentic British records of this species are from the Channel Islands, where the moth is moderately common; other British records are no doubt referable to the parthenogenetic form to which the names *ferchaultella*, Steph., and *pomona*, Staint., have been applied. *L. ferchaultella* occurs fairly commonly in the southern counties and the cases may sometimes be seen in vast numbers on fences and tree trunks. Whether this form is a species distinct from *L. lapidella* still seems in doubt. The question is very fully discussed by R. S. McDonogh in *Trans. of the Society for British Entomology*, Vol. 7, pp. 191-209 (1941).

18. *L. SEPNUM*, Speyer. The male antennae are shortly bipectinated. Wing expanse 13-15 mm. The forewings are dark brown, glossy with a slight purple tinge, a darker spot at the end of the cell. Hindwings are a little lighter and less glossy. Head and thorax are hairy and dark brown in colour. The female is apterous and has a yellowish-grey anal tuft.

The case is cylindrical with the posterior end rounded. It is 6-7 mm. long and 2-3 mm. in width, granulated with lichen powder, sometimes with two or three larger fragments of lichen or bark attached.

The larva feeds from August until May on lichens growing on the branches and trunks of trees, sometimes living for two years. The moth appears in June and early July and occurs rather locally in the southern counties.

- 1 Pachythelia villosella Ochs. ♂[↑]
- 1a Pachythelia villosella. ♀⁺
- 1b Pachythelia villosella,
larval case. ♂[↑]
- 2 Pachythelia opacella H.S. ♂[↑]
- 2a Pachythelia opacella,
larval case. ♂[↑]
- 3 Sterrhopteryx hirsutella Hb. ♂[↑]
- 3a Sterrhopteryx hirsutella,
larval case. ♂[↑]
- 4 Whittleia retiella Newm. ♂[↑]
- 4a Whittleia retiella, larval case.
- 5 Epichnopteryx pulla Esp. ♂[↑]
- 5a Epichnopteryx pulla, larval case.
- 6 Fumea casta Pall. ♂[↑]
- 6a Fumea casta larval case.
- 7 Proutia betulina Zell. ♂[↑]
- 7a Proutia betulina, larval case.
- 8 Talaeporia tubulosa Retz.
- 8a Talaeporia tubulosa, larval case.
- 9 Narycia monilifera Geof.
- 9a Narycia monilifera, larval case.
- 10 Solenobia inconspicuella Stt. ♂[↑]
- 10a Solenobia inconspicuella, larval
case with ♀⁺ calling.
- 10b Solenobia inconspicuella, larval
case with ♀⁺ ovipositing.
- 11 Narycia marginepunctella Stph. ♂[↑]
- 11a Narycia marginepunctella,
larval case.
- 12 Luffia sepium Spey. ♂[↑]
- 12a Luffia sepium, larval case.
- 13 Luffia ferchaultella Stph.,
larval case.
- 14 Solenobia lichenella Linn,
larval case.
- 15 Talaeporia staintoni Wals. ♂[↑]
- 15a Talaeporia staintoni, larval case.



S. N. A. Jacobs del.

British Species of the PSYCHIDAE.



BRITISH MOSQUITOES.

By ERIC W. CLASSEY, F.R.E.S.

Read 28th November 1945.

INTRODUCTION.

You have all, doubtless, been bitten at some time or another by mosquitoes or "gnats." Some of you may have noticed the males of these insects dancing in swarms at dusk, or their curious aquatic larvae wriggling about in rain water barrels.

Just over thirty species of mosquitoes are recorded from Great Britain. Of this number only about half are at all common or widespread, several are very rare and the rest are, apparently, rare or very local.

In all probability a number of the species now believed to be rare are not so, the lack of records being due, not to their absence but to the absence of entomologists who are interested in them.

Nearly all the species are easy to collect and rear. The apparatus needed is inexpensive and takes up very little space, and identification is rendered fairly easy by the existence of a very fine book on our British species (*The British Mosquitoes*: Marshall: B.M., 1938, price £1).

The mosquitoes belong to the family Culicidae of the sub-order Nematocera of the Order Diptera, and the family is divided into two well-defined tribes, the Anophelines and the Culicines.

LIFE HISTORY.

Mosquitoes have a complete metamorphosis and in all species the larval and pupal stages are aquatic.

Eggs. The eggs of the Anophelines are always laid separately on the water surface and bear a remarkable resemblance to tiny boats.

The upper surface is nearly flat, the lower surface very convex.

They usually bear a pair of centrally-placed "floats" and the division between the convex lower surface and the flat top is marked by a narrow "frill." In one of our British species (*Anopheles plumbeus*, Stephens) the floats are absent, but in all other respects the egg of this insect resembles those of the other species of the tribe.

The eggs of the Culicines are very varied. Some species lay them singly and some in rafts; some deposit them on the water surface and some (genus *Aedes*) deposit them on ground which will later become flooded during a rainy period.

LARVAE. The larva of the Culicine mosquito differs considerably from the Anopheline and one of the most obvious characteristics is its position in the water, which is determined by a process on the eighth abdominal segment, the siphon. The siphon is a tubular structure which, in the final instar, is usually strongly chitinous, and at its distal end

are two valves, which are applied to the water surface and act in much the same way as two tiny water-lily leaves, holding the open end of the siphon in contact with the air.

When the tip of the siphon is in contact with the water surface the body of the larva is thereby depressed beneath the surface by the length of the siphon.

Usually, when at rest, the Culicine larva hangs head downward, though it will occasionally twist its body so that its mouthparts come in contact with the surface film and so enable it to browse on floating debris; normally, however, it is a bottom feeder, coming to the surface occasionally to breathe or rest.

The Anopheline larva has no siphon, the breathing apparatus being a direct opening on the eighth abdominal segment, which is applied to the water surface. The larva lies immediately beneath and parallel with the surface film and it has several structures along its dorsum to keep it in this position.

The Anopheline larva is a surface feeder, yet, you will notice, its *dorsum* is in contact with the water surface; how then does it feed? Its mouth is ventral but the larva has the very peculiar ability of being able to rotate its head through 180 degrees and thus bring its mouth in contact with floating particles of food.

PUPÆ. The pupae of mosquitoes are comma-shaped and, as in most other Orders, vary but little from species to species, but it is easy to separate the pupae of Culicines and Anophelines by the shape of the respiratory trumpets, which are situated dorsally on the thorax.

In Anopheline pupae these trumpets are, generally speaking, more strongly dilated distally than in Culicines.

ADULTS. In the adult stage the two tribes are easily separated by a number of characters, among which one of the most outstanding is the difference in their resting positions in life.

The Anopheline rests with its proboscis in line with the thorax and abdomen.

The Culicine rests hump-backed, i.e., with the proboscis inclined toward the surface on which the insect is resting.

GENERAL.

Ecologically the British Mosquitoes can be divided into four fairly clear-cut groups: Coastal, Arboreal, Domestic, and Rural.

THE COASTAL GROUP contains three species, *Aedes caspius*, Pallas., *Ae. detritus*, Haliday, and *Ae. dorsalis*, Meigen.

Ae. caspius, though normally found in coastal areas, has from time to time been taken commonly inland in brackish water in such places as sewage farms, where meadows are periodically flooded with sewage effluent which is allowed to dry off. At each drying salts are deposited which lead to a gradual increase in the salinity of the water at subsequent floodings.

Ae. detritus is normally a coastal species but one inland locality is known for it; this is in the Worcestershire "brine district."

Ae. dorsalis is still accounted a rare species but, if searched for, would probably prove to be not uncommon in coastal areas, particularly in the south.

THE ARBOREAL GROUP also consists of three species: *Anopheles plumbeus*, Stephens, *Ae. geniculatus*, Olivier, and *Orthopodomyia pulchripalpis*, Rondani.

A. plumbeus is fairly common throughout most of Great Britain.

Ae. geniculatus is the most abundant arboreal species in southern England but, from available records, seems to be rare in the north and absent from Wales, Scotland, and Ireland.

O. pulchripalpis is one of the rarest British species, occurring perhaps more freely in the New Forest than elsewhere: two of its known localities are in Kensington!

THE DOMESTIC GROUP are, of course, the species with which we are most familiar (or, should I say, the species which are most familiar with us?). Of this group the commonest species is *Culex pipiens*, L. Fortunately for us this species very rarely bites man and is usually only of nuisance value. *Theobaldia annulata*, Schrank, which is in this group, is the species usually responsible for the more serious and poisonous cases of mosquito bite.

THE RURAL GROUP contains a number of very interesting species, among which may be mentioned *Taeniorhynchus richiardii*, Ficalbi, which, though common throughout southern England, is seldom recorded by reason of its unusual life-history. The larvae of this species do not come to the surface of the water to breathe. The larval siphon is adapted to pierce submerged vegetation and the larva obtains air by this means. The pupa is anchored to submerged vegetation by its respiratory trumpets but, when the emergence of the adult is imminent, it detaches itself and floats to the surface.

Culex apicalis, Adams, is a rural species which has always been considered very rare, only six British specimens having been recorded prior to 1943. In that year I found 43 larvae at Bagshot in Surrey and subsequent investigation has convinced me that, though very local, it is tolerably common in some places. This, I am sure, is also true of other species and I would like, in conclusion, to say that anyone who cares to take up this fascinating branch of entomology can be sure that he will be able to add materially to our knowledge of the group. *

COLLECTING NOTES ON THE BRITISH STAPHYLINIDAE.

By H. R. LAST.

Read 12th December 1945.

The Staphylinidae are easily recognisable by their very short elytra which leave several segments of the hindbody exposed. They are generally narrow and elongate in shape, and head, thorax, and abdomen are usually clearly defined.

In dealing with this family of beetles there are many difficulties for the beginner owing to great similarity of species and the comparative microscopical differences which separate them. As the beginner is not always the happy possessor of a microscope he finds the identification of his captures a most uncertain and laborious business, and often an impossibility. These remarks of mine are really intended as a "beetle reconnaissance," showing how certain details observed in the field at least give an indication, if not to the species, to some of the various genera into which the Staphylinidae are divided. Just as, in dealing with the Phytophaga and certain Rhynchophora, a clue to the species is provided by the plants from which they are taken, so also are there some reliable guides in respect of the "Staphs." There are many, however, that can be found in several types of habitat, but I have tried to consider them in regard to the habitat in which they are more commonly found.

In one of his admirable papers on Coleoptera, Mr Coulson, to whom I am indebted for his help and encouragement, writes: "The principle that should be adopted, therefore, is to learn to distinguish in the field . . . , and so these remarks are intended to help in the fulfilment of that purpose. I must say here that this method is unscientific, but for the beginner, such means should not be rejected, as having once secured a recognition knowledge he can then, as it were, work backwards and check up his species by the scientific distinctions.

To keep the subject as a reconnaissance it will be necessary to divide it into the various types of habitat, and to treat each habitat rather loosely under the sub-headings of structural appearance, method of locomotion, reactions to disturbance, size, and colouration.

There are some 900 or more species included in our British "Staphs" and they are well represented in practically every habitat where beetles are to be found. There are certain specialised habitats which will give a sure indication to certain species without reference to other considerations. Ants' nests will provide a number of species which are almost exclusively myrmecophilous. In the large nests of *Formica rufa*, L., for instance, should be found, *Thiasophila angulata*, Er., *Notothecta flavipes*, Grav., *Oxyopoda formiceticola*, Maerk., *Leptacinus formicetorum*, Maerk., *Dinarda maerkeli*, Kies., *Quedius brevis*, Er., *Othius myrmecophilus*,

Kies., and others. *Astilbus canaliculatus*, F., is to be found associated with several species of ants.

MOLES' NESTS. These will provide certain other species. *Quedius othiniensis*, Joh., is a fairly large beetle with red elytra, and *Q. nigro-coeruleus*, Fauv., is another large inhabitant. Birds' nests, too, give a limited number of the smaller species.

THE SEASHORE. This habitat provides a considerable number of species exclusive to the coast. The late J. H. Keys published a list of the maritime, sub-maritime and coast-frequenting species of South Devon and South Cornwall in 1918 in which forty-six species and two varieties of Staphylinidae are mentioned. This list has been added to since then by various workers.

The whole genus *Cafius* is exclusively coastal, being found under seaweed and other rejectamenta above high tide. *Cafius xantholoma*, Grav., is the commonest species. They somewhat resemble the genus *Philonthus*. *Polystoma*, a sub-genus of *Aleochara*, comprises four species all of which are found on the coast. They are easily distinguished from *Aleochara* proper by their dull appearance due to microscopical reticulation. *P. algarum*, Fauv., is perhaps the commonest, but *P. grisea*, Kr., and *P. obscurella*, Grav., are not uncommon.

BANKS OF PONDS AND STREAMS. There are no true aquatic "Staphs" although a large number inhabit the muddy banks of ponds and streams and climb the reeds. In 1938 G. B. Walsh (*Trans. Soc. Brit. Ent.*, Vol. 5, Part 4) published results of some interesting atmospheric experiments with various species of beetles from differing habitats and it would be safe to conclude that, with but few exceptions, all the Staphylinidae need a damp environment, the rate of the loss of water from the beetle being dependent upon the size of the elytra—even the true aquatic water-beetles (Hydradeephaga) showed a greater resistance to drought conditions owing to the close fitting elytra covering the whole body than did the Staphylinidae.

The banks of ponds and streams always provide a large number of species. A very conspicuous genus is *Paederus* with their bright blue-green and orange-red colouration in well-defined strong contrast. They are long and narrow in build and move quickly. *P. litoralis*, Grav., and *P. riparius*, L., appear to be the commonest from our total of four species and are often abundant in sphagnum. There are other long rather parallel looking beetles often found in similar damp situations. These belong to the *Lathrobium* genus. They are of the same general shape, but of stouter build and lack the bright colour-contrast. Roughly, the genus is divided in half—those with the elytra showing red in varying degrees and those which are entirely black. The species are often difficult to separate apart from the male characters. The synonymy is also very confused, which does not aid identification. *L. terminatum*, Grav., is one of the smaller species; a bright yellow spot on the posterior

margin of each elytron will at once indicate the species. *L. longulum*, Grav., is the smallest of the genus, from 3 to 4 mm., and can be readily known by its extremely narrow and linear build. Another genus to be found often in company with these is *Actobius*. *A. cinerascens*, Grav., is the only one of the three species which can be called common. It superficially resembles one of the smaller *Philonthus* species but the dull elytra due to reticulation is a clear distinguishing character. A *Philonthus* which may possibly turn up in such a situation as this is *P. nigrata*, Grav. Like all the members of this large genus of some fifty species it moves very rapidly. It is some 7 mm. long, of a shining black colour and could only be identified on the sheet after considerable experience with the whole *Philonthus* genus. *Tachyporus obtusus*, L., a fast moving rather small beetle, brightly coloured and of shiny appearance, is frequently found in damp situations, and sometimes swept from the vegetation at the sides of streams. The elytra are black for the basal half and red for the remainder and will readily indicate the species. Nearly all the species of the large genus *Stenus* are to be found at pond or stream sides but, with a few exceptions, these all need careful examination to determine the species. The genus, however, is a very easy one to recognise, as the eyes are so huge that they occupy the whole of each side of the head—similar to the lens of an old bull's-eye lantern—leaving a very narrow forehead. *Stenus bimaculatus*, Gyll., is easy to identify in the field, as it is of large size, over 5 mm., with legs partly yellow and a conspicuous reddish spot, sometimes paler, on each elytron. Where a stream is dried up, leaving the shingly bed exposed, *Stenus guttula*, Müll., may be found. It is smaller than *S. bimaculatus*, with two yellow-orange spots on each elytron. *Dianous caeruleus*, Gyll., occurs sometimes in large numbers in certain localities in stream refuse. They can easily be separated from the *Stenus* genus by their steel-blue colour and the distinct bright red spots on the elytra. The spots look just as though they were little spots of thick paint. A very productive site for many species of Coleoptera and especially members of the Staphylinidae is formed where a tree trunk lies across a stream and debris has collected. Perhaps the commonest genus found near water and especially streams is *Lesteva*. They are flat, with narrow head and thorax, and broad elytra which are much longer than in most genera of the group, leaving only two or three segments of the body exposed. They superficially resemble the species of *Dromius* in the Geodephaga. *Lesteva longelytrata*, Goez., and *L. heeri*, Fauv., are the commonest—they are sometimes abundant. The genus *Olophrum* is often represented by *O. piceum*, Gyll. The species are flat as are all the Omaliinae and look rather like a large *Lathrimaemum*. Should the banks of the stream be steep and clayey, one or two species of *Bledius* may be dug out of their burrows with a strong knife. A number of the smaller Aleocharinae can also be found in this situation. The genus *Tachyusa* may sometimes be found. They are small elegant little creatures with long legs. *T. constricta*, Er., is easily recognised by the constricted "waist." By

sweeping the reeds and vegetation by the waters' edge *Stenus pallitarsis*, Steph., can be taken and also a parallel-sided little beetle about $2\frac{1}{2}$ to 3 mm. long with two-thirds of the elytra straw-coloured—*Hygronoma dimidiata*, Grav. It is our only representative of the genus.

COW AND HORSE-DUNG. This habitat will provide a large number of species of several widely separated genera. Cow-dung is perhaps the more productive of numbers. The dung should be at least twenty-four hours old and by simply kneeling by the patch and watching on a warm sunny day in August or September some good species can be taken. It will soon be seen that a large number of beetles are continually arriving on the wing. A number of the *Palpicornia*, principally of the *Cercyon* genus, will land clumsily and find an entrance hole into the interior, but a number of "Staphs" will also be present and of these a large proportion will belong to the *Philonthus* genus. They usually land on the grass-blades nearby and approach the patch on foot. The genus is divided into several sections based on the number of punctures on the thorax. The first of these divisions contains three species either with no thoracic punctures or with only one. They all have a beautiful metallic green colour in varying degrees and are some of our largest *Philonthus*. *P. splendens*, F., is perhaps larger than the other two, especially the males. The shiny black head and thorax easily separates this species from its allies. *P. intermedius*, Bois., is, as its name implies, intermediate in size and puncturation of the elytra between *P. splendens*, F., and *P. laminatus*, Cz. The head, thorax and elytra are of a vivid green which scintillates beautifully in the sunlight. *P. laminatus* is perhaps less frequently found but is not uncommon. It is smaller, especially the head, which is oval rather than transverse as in the two previous species. The build is more slender and the puncturation of the elytra is closer and finer. The green colour is softer and not metallic, in some specimens it has a distinct shade of blue. Where the dung-surface has hardened and shows several round holes, a watch on these will frequently reveal a shiny black head or a protruding antenna. If a stick is sharply inserted an inch or two from this spot, the beetle is often cut off from retreat and forced out on to the surface. With care and with practice it can be captured without entailing much mess; the excitement of the chase, however, sometimes outweighs all precautions! It is interesting to note in passing that these beetles, moving rapidly throughout these tunnels, are never impeded by the dung and never show signs of contamination, in spite of the fact that the legs are armed with many spines and the elytra are well covered with long pubescence and longer setae. It may be, of course, as Fabre demonstrated with the garden spider and its immunity to its viscid threads, that they are covered with some oily substance which would account for their apparently suffering no inconvenience, but that is, so far, not proven. Other species of *Philonthus* which are sure to be present are *P. cruentatus*, Gyll., and *P. sanguinolentus*, Grav. Both have the elytra marked with red. *P. sanguinolentus* is of a larger build, especially the head. It has

a dull red humeral spot on the shoulders of the elytra and a red streak parallel with and near the suture. There are two or three named colour varieties of this species in which the spots coalesce or are absent. *P. cruentatus* is smaller and of a more slender build. It has two red apical spots on the elytra. These species are extremely active and very quickly take to wing and it takes speed and considerable ingenuity in capturing them. In spite of their rapid movements the red markings on the elytra strike the eye and give an indication of their identity. There is another species of much smaller size which has a red oblique streak from the shoulders known as *Philonthus varians*, Payk. The red streak is sometimes absent and this form has been named var. *unicolor*, Payk. Rev. C. E. Tottenham found that we actually had two species under *variens*, and introduced the new species in *E.M.M.*, 1937, as *P. jurgans*, Tott. These two species cannot be separated in the field as differentiation depends, apart from minor differences, upon the colour of the anterior coxae and the very marked difference in the aedeagus. Another *Philonthus* which will be flying round the dung-patch is *P. marginatus*, Str. This beetle is moderately large, about 9 mm., of graceful build and the black thorax is broadly margined on either side with bright yellowish-orange. This is quite conspicuous, although like most of its relatives the beetle is very rapid in its movements. The legs also are yellow and there is no real difficulty in distinguishing this species on sight. There are two other large "Staphs" which may be found flying round dung-patches, our two species of *Ontholestes*—*O. tessellatus*, Fc., and *O. murinus*, L., the former larger than the latter and having red legs. They are quite distinctive and cannot be confused with any other genus. On the subject of flight in Coleoptera, a very interesting article on beetles taken in the air at Wicken Fen by J. Omer-Cooper and Rev. C. E. Tottenham appeared in the *E.M.M.*, October 1934. Six hours, all told, were spent in sweeping the air with the net. Over 7000 specimens were taken, 98% of which were Staphylinidae.

FUNGUS. Especially when decomposing this abounds with many species and often teems with actual specimens, mostly of the smaller sorts. The fourteen or more species of the genus *Gyrophæna* are found almost exclusively in this habitat and usually in abundance. They are all small creatures not more than 2 mm. in length and walk with their abdomen turned up over the body and are coloured in varying proportions with yellow and black. The specific differences are microscopical, but a few species are partial to certain species of fungus. Other small species found in fungus are of the genus *Bolitochara*, which are all brightly coloured. *B. lucida*, Grav., and *B. bella*, Maerk., are the commonest of our species. *Oxypoda alternans*, Grav., is sometimes found with these—it is perhaps the easiest *Oxypoda* to identify in the field owing to its bright colouring. The whole *Bolitobius* genus is found in fungus. We have four rather closely related species which are fusiform in shape, the abdomen particularly being much narrowed to apex. *B. lunulatus*, L., is easily identified by its larger size, and the two lunules

of pale yellow on the blue-black elytra, and the red thorax. *Quedius lateralis*, Grav., is sometimes found in this habitat in fair numbers. It is 11-14 mm. long and can be distinguished by its dull black colour with the reflexed sides of the elytra, straw coloured. Two or three species of *Omalium* are often found in fungus. They are flat, rather broad beetles with long elytra which leave only about the last three segments of the body exposed. *O. rivulare*, Payk., is often abundant and *O. caesum*, Grav., and *O. excavatum*, Steph., also occur, but they are found in other habitats with almost the same frequency. The species of *Omalium* exude a peculiar odour which can be detected at some distance, sometimes before the beetles are seen. The odour will contaminate the hands or anything which comes into contact with the beetles. I have also found that, if put into a tube with other small "Staphs," the other species will very soon expire. Sweeping and beating will also provide species of the genus *Omalium*.

TREES. Quite a number of the Staphylinidae are associated with trees, mostly occurring beneath loose bark where they prey upon larvae of other species of Coleoptera. Sap from newly felled trees in the Spring attracts several species—particularly of the smaller Aleocharinae. The debris collected in holes in the trunk where branches may have broken off will, on occasions, produce *Quedius truncicola*, Fairm. (*ventralis*, Arag.), a large species known by the carmine-red tinge to the whole of the abdominal segments. *Quedius microps*, Grav., one of the smallest members of the genus, $4\frac{1}{2}$ -5 mm. long, may also be taken in such a situation. Unlike most of its relatives it has small eyes, which do not bulge at all and is of a brownish red appearance throughout. Beneath the bark a number of smaller species of other genera can be found. Of these *Homalota plana*, Gyll., the very small *Thectura cuspidata*, Er., the small flattened deep black *Dadobia immersa*, Er., and *Phlaeopora testacea*, Mn. (*reptans*, Er.), are more frequently met with. *Siagonium quadricorne*, Kirby, is another species easily recognised by its red-brown colour. The male has two short horns on the forehead. In the Autumn, *Staphylinus ater*, Gr., one of our largest "Staphs," can frequently be found taking refuge under loose bark of logs or felled trees. *Baptolinus affinis*, Payk., is moderately common under bark. It is about 6 mm. long and with the thorax and most of the body segments red.

CARRION. Quite a number of Staphylinidae are carrion feeders, particularly the genus *Aleochara*. They are easily recognised by their rather broad parallel-sided abdomen, the transverse thorax, which is almost semi-circular, and the thickened antennae. *Aleochara curtula*, Gz. (*fuscipes*, Gr.), is quite common. The elytra are very transverse and are reddish in colour. *A. lata*, Gr., is very similar but not quite so common and with black elytra; both species vary from 4 mm. to 7 mm. in size. A number of other carrion feeders, including several species of *Philonthus*, can be found but they are also found in other habitats.

HAY, STRAW AND VEGETABLE REFUSE. Perhaps the largest number of specimens and the greatest variety of species are found in decaying hay, straw, grass and vegetable refuse. The usual method of collecting is by shaking and sifting the debris over a sheet. A host of creatures of all kinds will fall on the sheet and will be scurrying as fast as their legs will carry them to the edges of the sheet. From the conglomeration of a host of living creatures a hasty glance will pick out the "Staphs" and one's attention must first be given to those more energetic than others or we may risk losing them. *Staphylinus olens*, Müll., our largest "Staph," is quite well known by almost everybody. Its dull black appearance and its size make it unmistakable. Two or three other species of this genus often turn up. *Staphylinus brunnipes*, F., is easily recognised by its red legs. *S. globulifer*, Fc., *S. winkleri*, Be., and *S. sculus* Stier., are very closely allied and have only been separated in this country during the last few years by the late T. H. Edmonds (*E.M.M.*, 1930, p. 273). *S. aeneocephalus*, Deg., is one of a group with golden pubescence. With one or two exceptions members of the genus *Staphylinus* may be known by their large size and parallel form and transverse rectangular head. *S. fuscatus*, Gr., is one of the exceptions and is rather similar to a *Quedius* by reason of the thorax converging anteriorly and the head with temples widening and posterior angles rounded. Three species of *Philonthus* must next claim attention. *Philonthus politus*, L. (*aeneus*, Rs.), *P. succicola*, Thom., and *P. tenuicornis*, M. & R. (*carbonarius*, Gyll.), are all to be found in this situation and all are very rapid in movement and will require immediate attention. All three are very similar in the field, being of a greenish-black or brassy-green appearance. *Philonthus fuscipennis*, Mann., is not so common but frequently turns up. It is narrower and duller and the underside of the first joint of the antennae is yellow—this is difficult to see in the field. *Philonthus decorus*, Grav., is sometimes taken in dead leaves—its soft satin-green appearance will easily distinguish it. A number of smaller *Philonthus* occur commonly. *P. fimetarius*, Gr., and *P. sordidus*, Gr., are very similar and about 6 mm. in length; *P. cephalotes*, Gr., and *P. umbratilis*, Gr., are somewhat larger but none of these could with certainty be identified on the collecting sheet. *P. albipes*, Gr., is also frequently taken and at least two species of the sub-genus *Gabrius*. *G. trossulus*, Nord., *G. nigrutilus*, Gr., and perhaps *G. velox*, Shp., will be taken. They cannot be separated in the field and one must rely principally on the male organs for separation. Females present even greater difficulties. If the vegetable refuse be in an advanced state of decay, *Philonthus rectangulus*, Shp., may turn up. This species may appear on a single occasion in a dozen or two, then in spite of searching it may not be seen again for months or even years. Tottenham first introduced it as British in 1935 (*E.M.M.*, 1935, p. 174) and it is still an open question whether it is a recent addition to our beetle fauna or whether it is a long established species which had been overlooked. It is shiny black, with transverse rectangular head

and sharp right-angled posterior corners and these features make it easy to pick out in the field; under a glass it has many more unmistakable features. There should be a number of species of *Quedius* in this rubbish. In the majority of the species the eyes are very large and bulging, which gives the head a circular appearance. The thorax contracts considerably towards the anterior margin and is as wide as or wider than the elytra at the base, giving it an Eton collar or a round-shouldered appearance. They are not so flattened as the species of *Philonthus* and the anterior legs are stout with the tarsi strongly expanded in both sexes. The majority have a habit, on being disturbed, of lying just as they have fallen, sometimes on their sides or even on their backs with the legs held rigidly and the body slightly bent round. They remain motionless for a few seconds, then take to their legs and move as fast as any *Philonthus*. It is as well to wait a few seconds to allow this to take place. A very common species is *Quedius cinctus*, Payk. It is 6 to 8 mm. long, very polished and has a sutural, apical and side border of yellow to the black elytra. The elytra are very shiny and have only three rows of five or six punctures each. The abdomen is aeneous. It is very active and is frequently seen on the wing. There are two larger species, both black, both common, *Quedius fuliginosus*, Grav., and *Quedius tristis*, Grav. In the former the scutellum is punctured, in the latter it is glabrous. Mr Britten has recently found another species—*subfuliginosus*, Britt.; the distinction rests primarily on the aedeagus. *Q. molochinus*, Grav., is slightly smaller, of narrower build and parallel in shape. The elytra are shorter than the thorax and dark red, except in var. *denudatus*, Stephs., in which they are black. *Q. cruentus*, Ol., is brightly coloured with the elytra bright red and the last abdominal segments are wholly or partly coloured red. *Ab. virens*, Rg., has the elytra suffused with black. *Q. picipes*, Mn., is much smaller with the hindbody strongly tapering. The thorax is often bright red with hindbody iridescent. *Q. rufipes*, Grav., is of the same shape and build but has dull black elytra. *Q. boöps*, Grav., is one of the smallest of the genus, with large bulging eyes. *Q. scintillans*, Grav., sometimes turns up; it is small and beautifully iridescent. *Q. mesomelinus*, Mn., is sometimes common, but belongs to a difficult group and cannot with certainty be identified in the field. A number of long parallel-sided beetles are bound to be seen. They belong to the genus *Xantholinus*. When first shaken on the sheet they bend their head and thorax and hindbody rather like a watch-spring and remain like this for several seconds before opening out and moving rather snake-like through the debris. They are mostly black in colour. *X. punctulatus*, Payk., and *X. linearis*, Ol., are very common; *X. angustatus*, Steph., and *X. longiventris*, Heer, are less so, but with the exception of *X. glabratus*, Grav., they are hardly distinguishable in the field. *X. glabratus*, Grav., is the largest species and can readily be known by its large size and shining dark red elytra. In the allied genus *Leptacinus* the species are smaller; *L. batychnus*, Gyll., and *L. linearis*, Grav., are often quite common.

A number of beetles somewhat resembling ants are bound to be seen. They belong to the genus *Stilicus*. Their large orbicular heads, the thorax which contracts strongly both anteriorly and posteriorly give this ant-like appearance. *S. rufipes*, Gm., is one of the larger species; *S. affinis*, Erich., and *S. orbiculatus*, Payk., are also common. *S. angustatus*, Fc., is easily recognisable by its red thorax. In a paper on the Coleoptera of Chatham, Mr Stephens mentions never having found this species except in straw, and my experience agrees with his observations.

The very fast-moving genus *Tachyporus* is bound to be represented by one or more species. They are brightly coloured with yellow, red and black in varying degrees, very shiny and strongly tapering to the apex of the abdomen. *T. chrysomelinus*, L., and *T. hypnorum*, F., are found almost everywhere.

One or two species of *Tachinus* are often found in this habitat. They have a large semi-circular thorax and they taper strongly to the apex of the abdomen. They are mostly black with obscure red markings, except *T. subterraneus*, L., which has a large orange-yellow patch on each elytron. A nearly related genus is *Leucoparyphus*. We have one species only, *L. silphoides*, L., which superficially resembles *Tachinus* but is smaller, with the yellow elytra spotted with black. It moves much more quickly than *Tachinus* and frequently takes to wing.

By this time many of the more lethargic species are moving. A genus usually found commonly, sometimes in profusion, is *Oxytelus*. *O. tetracarinatus*, Blk., 2 mm. long, *O. complanatus*, Er., about 3 mm., both dull black, are found almost everywhere. The "little fly" in the eye on a warm spring day is usually *O. tetracarinatus*, Blk. *Oxytelus rugosus*, F., *O. sculpturatus*, Grav., *O. laqueatus*, Mm. (known by its red elytra), *O. sculptus*, Grav., are all common but need a lens for reliable determination. They are attracted by newly-dug ground and can be seen flying over it and disappearing beneath.

Several smaller species resembling the Clavicornia can be seen clambering laboriously over the refuse. They are black with the elytra almost covering the whole of the hindbody. They belong to the *Proteinus* genus. In company with these and moving at the same slow pace are a number of very flat beetles belonging to the *Megarthus* genus. They are very dull and roughened and are often covered with mud. A number of reddish-yellow beetles belonging to the *Medon* genus are often common in straw. They are mostly *M. propinquus*, Br., but some of the rarer species may on occasion turn up. I find that they prefer rather drier conditions than most other genera. A very large number of the smaller "Staphs" will be found in almost every situation. They belong to the large sub-family Aleocharinae and are mainly similar in appearance and almost impossible to identify in the field. Even with the aid of the microscope it is frequently a most difficult matter to appreciate the specific differences and authorities conflict in their determinations. A few other genera, however, are quite distinctive. The

Falagria and *Autalia* species can easily be picked out by their truncate heads, *Oligota* by their diminutive size and rather wide appearance, *Hypocyrtus* by their globose shape rather like a small Clavicorn, *Syntomium* by the aeneous elytra which are very coarsely punctured, and the interesting genus *Myllaena*, found in damp situations, by the sharp pointed body and stream-lined appearance.

There are many more "Staphs," of course, which I have been unable to mention but of which only experience can give any recognition knowledge. Like all other subjects dealing with natural history, the more time and study given to the Staphylinidae, far from exhausting the subject, only whets one's appetite for more, and creates further interest and enjoyment in what to my mind is the most fascinating family of British Coleoptera.

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CORRECTION.

The list of the British Plecoptera published in the Proceedings and Transactions for 1944-45 contains two errors. The list should read as follows:—

PLECOPTERA, Burmeister.

Sub-order SUBULIPALPIA, Klapálek.

Perlodidae, Klapálek.

Perlodes mortoni, Klapálek.
Dictyoperygella recta, Kempny.
Isogenus nubecula, Newman.

Perlidae, McLachlan.

Dinocras cephalotes, Curtis.
Perla carlukiana, Klapálek.
Isoperla grammatica, Poda.
I. griseipennis, Pictet.
Chloroperla apicalis, Newman.
C. torrentium, Pictet.
C. tripunctata, Scopoli.

Sub-order FILIPALPIA, Klapálek.

Capniidae, Klapálek.

Capnia nigra, Pictet.*C. atra*, Morton.*C. vidua*, Klapálek.

Taeniopterygidae, Klapálek.

Taeniopteryx nebulosa, Newport.*Brachyptera trifasciata*, Pictet.*B. risi*, Morton.*Rhabdiopteryx anglica*, Kimmins.

Leuctridae, Klapálek.

Leuctra geniculata, Stephens.*L. moselyi*, Morton.*L. hippopus*, Kempny.*L. inermis*, Kempny.*L. nigra*, Olivier.*L. fusciventris*, Stephens.

Nemouridae, Klapálek.

Protonemura montana, Kimmins.*P. meyeri*, Pictet.*P. praecox*, Morton.*Amphinemura cinerea*, Olivier.*A. standfussi*, Ris.*Nemoura variegata*, Olivier.*N. dubitans*, Morton.*N. cambrica*, Stephens.*N. avicularis*, Morton.*N. erratica*, Claassen.*Nemurella inconspicua*, Pictet.

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Entomological and Natural History
Society.

1946-47.

WITH NINETEEN PLATES.

**PUBLISHED AT THE SOCIETY'S ROOMS,
BURLINGTON HOUSE, PICCADILLY, - LONDON, W.1.**

12th DECEMBER 1947.

PRICE : One Pound, Two Shillings and Sixpence.

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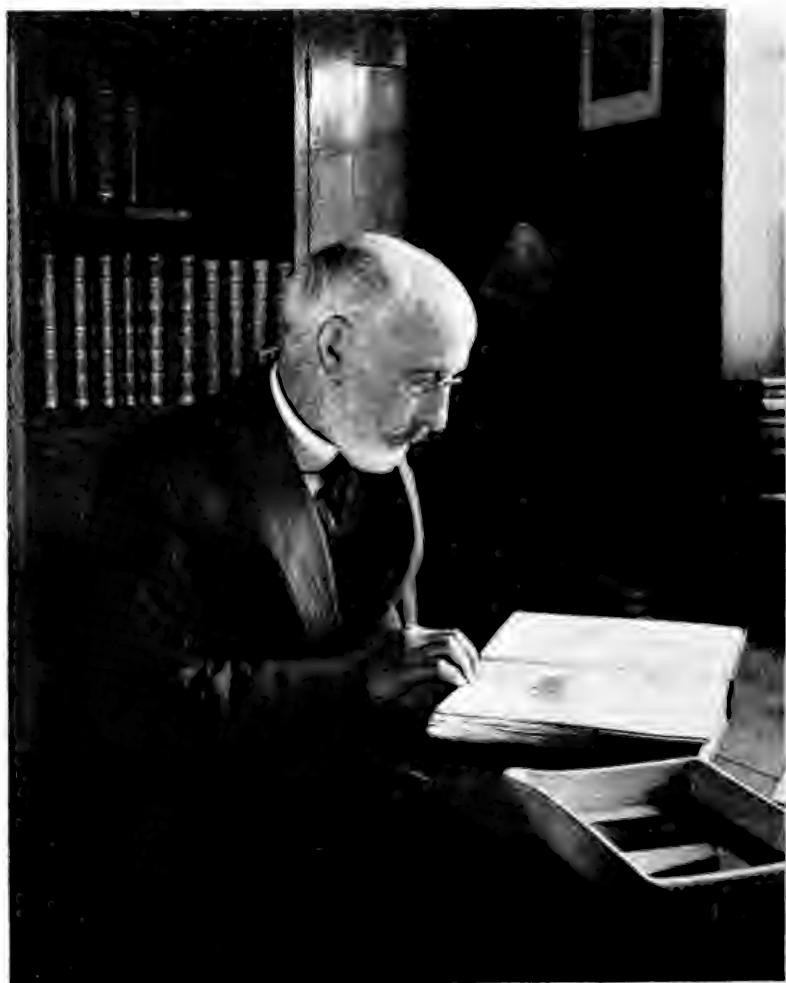
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Entomological and Natural History Society

1946-47.

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PUBLISHED AT THE SOCIETY'S ROOMS:
BURLINGTON HOUSE, PICCADILLY, LONDON, W.1.

The Council gratefully acknowledges
the receipt from the Royal Society of
£125
towards the cost of this Publication.



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1900 W. J. LUCAS, B.A., F.E.S. (dec.).	1938 F. STANLEY-SMITH, F.R.E.S.
1901 H. S. FREMLIN, M.R.C.S.,	1939 H. B. WILLIAMS, LL.D., F.R.E.S.
L.R.C.P., F.E.S.	1940 E. A. COCKAYNE, D.M., F.R.C.P.,
1902 F. NOAD CLARK (dec.).	F.R.E.S.
1903 E. STEP, F.L.S. (dec.).	1941 F. D. COOTE, F.R.E.S. (dec.).
1904 A. SICH, F.E.S. (dec.).	1942 S. WAKELY.
1905 H. MAIN, B.Sc., F.E.S.	1943 R. J. BURTON, L.D.S., R.C.S.Eng.
1906-7 R. ADKIN, F.E.S. (dec.).	1944 STANLEY N. A. JACOBS.
1908-9 A. SICH, F.E.S. (dec.).	1945-46 Capt. R. A. JACKSON, R.N.,
1910-11 W. J. KAYE, F.E.S.	F.R.E.S.

LIST OF MEMBERS.

(Revised to 17th April 1947.)

Chief subjects of Study:—*b*, Botany; *bi*, Biology; *c*, Coleoptera; *cr*, Crustacea; *d*, Diptera; *ec. ent*, Economic Entomology; *ent*, Entomology, General; *e*, Exotic; *g*, Genetics; *hem*, Hemiptera; *hym*, Hymenoptera; *l*, Lepidoptera; *mi*, Microscopy; *ml*, Micro-lepidoptera; *mo*, Mollusca; *n*, Neuroptera; *nat. hist*, Natural History; *nat. phot*, Nature Photography; *od*, Odonata; *oo*, Oology; *orn*, Ornithology; *orth*, Orthoptera; *r*, Reptiles; *rh*, Rhopalocera; *t*, Trichoptera; *z*, Zoology.

HONORARY MEMBERS.

Including the Honorary Life President, (L.P.); Honorary Members appointed under Bye-law 10(a), (Hon.); and Special Life Members appointed under Bye-law 10(b), (S.L.).

DATE OF APPOINT- MENT.	DATE OF JOINING SOCIETY.	CLASS.	NAME, ADDRESS AND INTERESTS.
10.1.1935. 13.1.1945.	12. 5.1887.	Hon. L.P.	TURNER, HY. J., F.R.E.S., F.R.H.S., "Latemar," 25, West Drive, Cheam, Surrey. <i>l, e l</i> .
14.8.1941.	4. 2.1886.	Hon.	FREMLIN, Major H. S., M.R.C.S., L.R.C.P., F.R.E.S., "Heavers," Ryarsh, Kent. <i>l</i> .
10.1.1942.	10. 1.1924.	Hon.	CHAPMAN, Miss L. M., "Arolla," Water- low Road, Reigate, Surrey.
1.1.1947.	1. 4.1886.	S.L.	ADKIN, B. W., F.R.E.S., "Highfield," Pembury, Tunbridge Wells, Kent. <i>l, orn</i> .
1.1.1947.	28. 1.1889.	S.L.	MOORE, H., F.R.E.S., 9, Hoopwick Street, Deptford, London, S.E.8. <i>l, hem, d,</i> <i>e l, e hym, e d, mi</i> .
1.1.1947.	24.10.1889.	S.L.	MANSBRIDGE, W., M.S.C., F.R.E.S., "Mon- reith," Derby Road, Formby, Liver- pool, Lancs. <i>l, c</i> .
1.1.1947.	24.10.1889.	S.L.	WAINWRIGHT, COLBRAN J., F.R.E.S., 50, Christchurch Road, Bournemouth, Hants. <i>l, d</i> .
1.1.1947.	9. 4.1891.	S.L.	HAMM, A. H., M.A., A.L.S., F.R.E.S., 22, Southfield Road, Oxford. <i>l</i> .
1.1.1947.	27.10.1892.	S.L.	MAIN, HUGH, B.S.C., F.R.E.S., F.Z.S., 9, Woodside Road, Woodford Wells, Essex. <i>l, nat. phot, c</i> .
1.1.1947.	26.11.1896.	S.L.	BARNETT, T. L., 31, Littleheath Road, Selsdon, Surrey. <i>l</i> .

LIFE, ORDINARY, AND COUNTRY MEMBERS.

YEAR OF
ELECTION.

- 1945 ADAMS, H. W., 14, Scott Road, Kettering, Northants. *l.*
- 1937 ADAMS, R. W., 32, Moor Park Road, Northwood, Middlesex. *l.*
- 1922 ADKIN, J. H., "Lamorran," Oak Lane, Sevenoaks, Kent. *l.*
- 1943 ALLEN, DONALD, F.R.P.S., F.R.S.A., F.R.E.S., 698, Warwick Road, Solihull, Warwickshire. *hym, ent, l, nat. phot, mi.*
- 1907 ANDREWS, H. W., F.R.E.S., c/o Martins Bank, Eltham, London, S.E.9. *d.*
- 1946 ASTBURY, C. F., 83, Gunterstone Road, West Kensington, London, W.14. *l.*
- 1934 ATKINSON, J. L., "Down's Cottage," 76, Northwood Road, Tankerton, Kent. *l.*
- 1936 AUGUST, V. E., M.I.T., A.R.I.P.H.H., F.R.H.S., Council, 59, Hillcross Avenue, Morden, Surrey. *ent.*
- 1939 BAKER, Capt. D. B., R.A.O.C., F.R.E.S., Ordnance Directorate, G.H.Q., C.M.F. *l, c.*
- 1937 BALLINGER, D. E., "The Cottage," Canham Road, Acton, London, W.3. *l.*
- 1945 BALTER, R. S., F.R.E.S., 18, Ferncroft Avenue, London. N.W.3. *ent, mi, bi.*
- 1942 BANNER, JOHN V., M.R.C.S., L.R.C.P., F.R.E.S., "Wykehurst," 41, Varndean Gardens, Brighton, 6. *l.*
- 1933 BAYNES, E. S. A., F.R.E.S., c/o Glyn Mills & Co., Childs Branch, 1, Fleet Street, London, E.C.4. *l.*
- 1943 BECHER, Lt.-Col. L. E., "Newstead," Charterhouse Road, Godalming, Surrey. *l.*
- 1944 BEDFORD, E. J., F.R.P.S., 11, St John's Terrace, Lewes, Sussex. *nat. hist.*
- 1938 BEIRNE, B. P., PH.D., F.R.E.S., F.L.S., 4, Tobernea Terrace, Monkstown, Co. Dublin, Eire. *ml.*
- 1929 BELL, J. H., Dudswell Rise, Northchurch, Berkhamsted, Herts.
- 1942 BELL, P. J., B.A., F.L.S., Dudswell Rise, Berkhamsted, Herts. *ent.*
- 1947 BEST, A. A., 131, Woodham Lane, Lew Haw, Weybridge, Surrey. *l.*
- 1945 BIRCH, L., 225, Coleshill Road, Ward End, Birmingham, 8. *ent.*
- 1911 BLAIR, K. G., D.Sc., F.R.E.S., "Pentwyn," Afton Road, Freshwater, I.W. *ent.*
- 1945 BLASDALE, PHILIP, "Brooklyn," The Ash, Wombwell, Yorks. *ent.*
- 1942 BLEST, T., "Homestead," Higham Lane, Tonbridge, Kent. *l.*
- 1926 BLISS, A., 4 Monahan Avenue, Purley, Surrey. *l.*
- 1941 BLOOD, B. N., L.R.C.S.I., 25, Spencer Gardens, Eltham, London, S.E.9. *hym.*
- 1925 BLYTH, S. F. P., "Cleaveland," Chislehurst, Kent. *l.*

**YEAR OF
ELECTION.**

- 1934 BORRER, C. D., "The Old Manor House," Cley-next-Sea, Norfolk.
ent.
- 1945 BOSTOCK, E. D., F.R.E.S., 8, Pelham Gardens, Folkestone, Kent. *l.*
- 1944 BOWDEN, S. R. B.SC., A.R.C.S., A.R.I.C., 33, South View, Letchworth, Herts. *l.*
- 1946 BOWSER, E. W., J.P., Tytton Hall, Boston, Lincs. *l.*
- 1946 BOYCE, B., 51, South Street, Chichester, Sussex. *l.*
- 1946 BRADLEY, J. D., 15, Ridley Road, Wimbledon, London, S.W.19. *l.*
- 1947 BREThERTON, R. F., M.A., F.R.E.S., Ottershaw Cottage, Ottershaw, Surrey. *l.*
- 1933 BRETT, G. A., B.SC., A.R.C.S., D.I.C., 2, Old Claygate Lane, Hinchley Wood, Esher, Surrey. *ent.*
- 1935 BRETT, Mrs KATHLEEN S. L. F., 2, Old Claygate Lane, Hinchley Wood, Esher, Surrey. *bi*
- 1940 BRITTEN, H., M.M., F.R.H.S., F.INST.P.A., "Newholme," 21, Toller's Lane, Old Coulsdon, Surrey. *ent (Chalcididae).*
- 1930 BROOKE, Miss W. M. A., F.L.S., 300, Philip Lane, London, N.15.
ec. ent, b, marine life.
- 1939 BROWN, A. G., L.D.S., R.C.S.ENG., 17, The Vale, Golders Green, London, N.W.11. *l.*
- 1943 BROWN, S. C. S., L.D.S., R.C.S.ENG., H.D.D.EDIN., 142, Richmond Park Road, Bournemouth, Hants. *ml, hym.*
- 1938 BROWN, Major S. HAMILTON, L.D.S., R.C.S.ENG., 175, Heene Road, Worthing, Sussex. *l.*
- 1936 BUCK, F. D., *Lanternist*, 31, Elthorne Road, Holloway Road, London, N.19. *c.*
- 1909 BUCKSTONE, A. A. W., 69, Gibbons Road, Kingston-on-Thames, Surrey. *l.*
- 1927 BULL, G. V., B.A., M.B., "White Gables," Sandhurst, Kent. *l.*
- 1915-37 and 1945 BUNNETT, E. J., M.A., 46, Redstone Park, Redhill, Surrey. *c.*
- 1946 BURKHARDT, Col. V. R., late R.A., 5, Bridge Road, Cranleigh, Surrey. *l.*
- 1946 BURNELL, C. M., 34, Park Drive, Upminster, Essex. *l.*
- 1944 BURNS, B. S., 1, Jamaica Villas, Stoke Road, Gosport, Hants. *l.*
- 1944 BURROWS, D. S., 33, Brookehowse Road, Bellingham, London, S.E.6. *l.*
- 1938 BURTON, Miss MARGARET, L.D.S., R.C.S.ENG., Army Dental Service, Greencot, Seaward Avenue, Barton-on-Sea, Hants. *bi.*
- 1938 BURTON, R. J., L.D.S., R.C.S.ENG., Greencot, Seaward Avenue, Barton-on-Sea, Hants. *l.*
- 1947 BUSBRIDGE, W. E., "Gresham," Bradbourne Park Road, Seven-oaks, Kent. *l.*
- 1922 BUSHBY, L. C., F.R.E.S., c/o Zoological Society of London, Regent's Park, London, N.W.8. *c, hem.*

YEAR OF
ELECTION.

- 1909-22 and 1937 CARDEW, Col. P. A., *Council*, 21a, Thornton Hill, Wimbledon, London, S.W.19. *l*.
- 1945 CARLIER, STUART E. W., F.R.E.S., 6, Warwick Buildings, Warwick Road, Solihull, Warwickshire. *l, c*.
- 1945 CARPENTER, Prof. G. D. HALE, D.M., M.B.E., F.R.E.S., Hope Professor of Zoology (Entomology), University Museum, Oxford. *ent*.
- 1899 CARR, Rev. F. M. B., M.A., L.T.H., The Croft, Shore Road, Sandbanks, Bournemouth, Hants. *l, n*.
- 1946 CARTER, R. A., The Croft, West Runton, Norfolk. *c*.
- 1946 CHALMERS-HUNT, MICHAEL, Little Orchard, Broad Oak, Canterbury, Kent. *l*.
- 1946 CHAMPION, Lt.-Col. C. C., Hailey Lane, Hertford. *l, phot*.
- 1945 CHAPMAN, F. W., 27, Rugby Place, Brighton 7, Sussex. *l, e l*.
- 1945 CHARLSON, S., 34, Car Bank Street, Atherton, Manchester. *l, ent, g*.
- 1936 CHARTRES, S. A., F.R.E.S., 9, King's Drive, Eastbourne, Sussex. *ent*.
- 1922 CHEESEMAN, C. J., 26, Lyndhurst Road, Birkdale, Southport, Lancs. *l*.
- 1945 CHRISTIE, L., 65, Rowan Road, Streatham, London, S.W.16. *ent*.
- 1936 CLASSEY, E. W., F.R.E.S., *Council*, 5, Carlton Avenue, Feltham, Middlesex. *l*.
- 1943 COATES, R. J., 6, Malvern Road, Surbiton, Surrey. *ent*.
- 1915 COCKAYNE, E. A., D.M., F.R.C.P., F.R.E.S., "Merstone," Tring, Herts. *l, g*.
- 1934 COLE, G. A., M.A., F.C.A., Queen Mary's Hospital, Roehampton, London, S.W.15.
- 1946 COLLIER, Major A. E., c/o Lloyds Bank, 6, Pall Mall, London, S.W.1. *l*.
- 1935 COLLINS, R. J., F.R.E.S., Roslyn, Blackthorne Road, Gt. Bookham, Surrey. *l*.
- 1946 COMAN, R., 78, Norwood Road, Herne Hill, London, S.E.24. *l*.
- 1938 CONDER, G. M., M.R.C.S., L.R.C.P., L.D.S., 33, Grove Avenue, Sutton, Surrey. *l*.
- 1936 COOPER, B. A., B.Sc., A.R.C.S., F.R.E.S., 27, Spilsby Road, Boston, Lincs. *c (elateroidea), ecology, ec. ent, l, nat. phot. (Life Member.)*
- 1945 CORBET, A. STEVEN, D.Sc., Ph.D. (LOND.), F.R.I.C., 128, Westwood Road, Tilehurst, Reading, Berks. *ent*.
- 1923 CORK, C. H., 11, Redesdale Street, Chelsea, London, S.W.3. *l*.
- 1922 COUCHMAN, L. E., F.R.E.S., c/o Mrs A. Couchman, 82, Newbury Road, Bromley, Kent, and in Tasmania. *l*.
- 1909 COULSON, F. J., *Hon. Curator*, "Burnigill," 24, Springfield Avenue, Merton Park, London, S.W.20. *c, hem, l*.
- 1918 COURT, T. H., F.R.E.S., "Oakleigh," Market Rasen, Lincoln.

YEAR OF
ELECTION.

- 1943 COUSINS, ROBERT J., A.C.P., M.R.S.T., F.R.E.S., F.R.S.A., F.Z.S.,
High Street, Ashcott, near Bridgwater, Somerset. *mo, c.*
- 1898-1934 and 1937 CRABTREE, B. H., F.R.E.S., "Highfield," Alderley
Edge, Cheshire. *l.*
- 1934 CRASKE, J. C. B., F.R.E.S., 33, Hinchley Drive, Hinchley Wood,
Esher, Surrey. *l.*
- 1937 CRASKE, R. M., 207, King's Road, Chelsea, London, S.W.3. *ent.*
- 1918 CRAUFURD, CLIFFORD, F.R.E.S., "Denny," Bishops Stortford,
Herts. *l.*
- 1933 CREWDSON, R. C. R., F.R.E.S., "The Grange," Delamere, North-
wich, Cheshire. *l.*
- 1947 CRIPPS, C. H., B.A., Bulls Head Farm, Eakley Lanes, Stoke Gold-
ington, Bletchley, Bucks. *l, rh. (Life Member.)*
- 1920 CROCKER, Capt. W., 55, Townley Road, Bexleyheath, Kent. *l.*
- 1932 CROW, P. N., "Heathcote," Bigfrith, Cookham Dean, Berk-
shire. *l.*
- 1946 CURRIE, P. W. E., M.C., F.R.E.S., 102, Burdon Lane, Belmont,
Sutton, Surrey. *hym, orth.*
- 1937 CURTIS, A. E., F.R.E.S., "The Cottage," Ifold Estate, Loxwood,
Billingshurst, Sussex. *l.*
- 1946 CURTIS, W. PARKINSON, F.R.E.S., M.S.B.E., 70, Princess Road,
Bournemouth, Hants. *l.*
- 1927 DANBY, G. C., "Sheringham," 31, Albion Road, Sutton,
Surrey. *l.*
- 1946 DARBY, MISS DAPHNE A., B.SC., 139, Huntingdon Road, Cam-
bridge. *ec. ent.*
- 1945 DAVIDSON, A. R., 2, Foster Road, Formby, Liverpool. *l, c.*
- 1940 DAVIS, G. A., 76, Station Road, Chingford, London, E.4. *c.*
- 1900 DAY, F. H., F.R.E.S., Blackwell Lodge West, Carlisle. *l, c.*
- 1938 DEAL, JAMES, 18, Manor Road, West Wickham, Kent. *l.*
- 1933 DEMUTH, Lieut. R. P., R.N.V.R., c/o Lloyds Bank, West South-
bourne, Bournemouth. *l.*
- 1930 DENVIL, H. G., 4, Warwick Road, Coulsdon, Surrey. *l, c.*
- 1945 DIXON, C. H., Northbrook Farm, Micheldever, Hants. *ent.*
- 1921 DOLTON, H. L., 36, Chester Street, Oxford Road, Reading, Berks. *l.*
- 1939 DOUBLEDAY, B. S., F.R.E.S., Monks Risborough, Aylesbury, Bucks.
Chalcidoidea.
- 1936 DOUDNEY, S. P., "Thurne," 110, Foxley Lane, Purley, Surrey. *l.*
- 1946 DOWNES, W. E., 29, Aragon Road, Kingston, Surrey. *l.*
- 1930 DUDBRIDGE, B. J., B.A., c/o The Secretariat, Dar-es-Salaam,
Tanganyika. *ent.*
- 1946 DUFFY, E. A. J., F.R.E.S., 28, Lansdowne Road, Croydon, Surrey. *c.*
- 1946 DUNBAR, J. G., 12, Russell Grove, Mill Hill, London, N.W.7. *l.*
- 1927 EAGLES, T. R., *Hon. Editor*, 32, Abbey Road, Enfield, Middle-
sex. *l, c.*

**YEAR OF
ELECTION.**

- 1943 EASTMURE, D. F., "Granta," 43, Muswell Road, Muswell Hill, London, N.10. *l.*
- 1937 EASTON, N. T., D.F.H., F.R.E.S., Sulby Hall, Welford, near Rugby, Staffs. *l, g, nat. phot.*
- 1946 ECKFORD, A., M.D.CANTAB., M.R.C.S., Strafford House, Boston, Lincs. *l.*
- 1945 EDWARDS, G. GRAVELEY, Talbot Croft, St Albans, Herts. *l.*
- 1945 EDWARDS, R. C., Arlesley, Pilgrims' Way, Westerham, Kent. *ent.*
- 1941 EDWARDS, Rev. Canon T. G., M.A., F.Z.S., Holy Trinity Vicarage, Tulse Hill, London, S.W.2. *l.*
- 1933 ELGOOD, W. S., M.A., North Brink, Wisbech, Cambs. *l.*
- 1945 ELLISON, R. ELDON, 1, Redland Green Road, Bristol, and British Legation, Jedda, Saudi Arabia. *l.*
- 1937 EMBRY, B., F.R.E.S., 23, Mill Drove, Uckfield, Sussex. *l.*
- 1932 ENNIS, L. H., 14, Ernle Road, Wimbledon, London, S.W.20. *l.*
- 1935 ENSOR, G. A., "Oakleigh," Knoll Road, Dorking, Surrey. *l, hym.*
- 1946 EVANS, B. M., 36, Hayes Chase, West Wickham, Kent. *l.*
- 1945 EVANS, L. J., 73, Warren Hill Road, Birmingham, 23. *l.*
- 1946 FAIRCLOUGH, R., "Blencathra," Deanoak Lane, Leigh, Surrey. *ent.*
- 1920 FARMER, J. B., "Ashleigh," Beatrice Road, Oxted, Surrey. *l, c.*
- 1924 FASSNIDGE, WM., M.A., F.R.E.S., 4, Bassett Crescent West, Southampton. *l, n, hem.*
- 1946 FERGUSON, L. F., L.D.S., R.C.S., "Harley House," Gloucester Road, Teddington, Middlesex. *c.*
- 1930 FERRIER, W. J., F.R.E.S., 86, Portnalls Road, Coulsdon, Surrey. *l.*
- 1946 FFENNELL, D. W. H., Martyr Worthy Place, Winchester, Hants. *l.*
- 1946 FIELD, Mrs P. L. W., "Melbourne," 191, Dyke Road, Brighton, Sussex. *ent.*
- 1936 FINNIGAN, W. J., 87, Wickham Avenue, Cheam, Surrey. *ent, nat. phot.*
- 1943 FORD, E. B., M.A., D.SC., F.R.S., F.R.E.S., The University Museum, Oxford. *ent, g.*
- 1920 FORD, L. T., B.A., *President*, "St Michaels," 70, Park Hill Road, Bexley, Kent. *l.*
- 1941 FORD, R. L. E., F.R.E.S., F.Z.S., "Dunkeld," 51, Park Hill Road, Bexley, Kent. *ent.*
- 1939 FORSTER, H. W., 76, Station Road, Chingford, London, E.4. *c.*
- 1915 FOSTER, T. B., "Downlands," 24, York Road, Selsdon, Surrey. *l.*
- 1933 FRASER, ANGUS, 28, Gloucester Road, Tankerton, Kent. *c.*
- 1945 FRASER, Miss CAROL DE C., Warren Mount, Freshfield, near Liverpool. *l.*
- 1943 FRASER, G. de C., Warren Mount, Freshfield, near Liverpool. *ent.*
- 1943 FRASER, Mrs G. de C., Warren Mount, Freshfield, near Liverpool. *ent.*

**YEAR OF
ELECTION.**

- 1945 FRASER, Capt. M. G., 111, Broadhurst Gardens, London, N.W.6. *c.*
- 1945 FREEMAN, JOHN A., B.SC., PH.D., A.R.C.S., F.R.E.S., 9, Wendover Road, Bromley, Kent. *ent, ecology.*
- 1946 FRIEDLEIN, A. F. E., F.R.E.S., Wirastal, Bishops Hill, Hutton, Essex. *l.*
- 1946 GARDINER, B. O. C., The Red House, River-in-Dover, Kent, and 34a, Storey's Way, Cambridge. *ent.*
- 1930 GILLIAT, F. T., B.A., F.R.E.S., 25, Manor Rd., Folkestone, Kent. *l.*
- 1929 GLEGG, D. L., F.R.E.S., "Birchstone," Coombe Park, Kingston, Surrey. *l.*
- 1946 GODDARD, T. D., F.R.E.S., Long Hoyle Farm, Heyshott, Midhurst, Sussex. *l.*
- 1936 GOODBAN, B. S., 81, West Street, Ewell (Epsom), Surrey. *l.*
- 1935 GOODLIFFE, F. D., M.A., F.R.E.S., Lord Wandsworth Agricultural College, Long Sutton, Basingstoke, Hants. *ec. ent.*
- 1946 GOODMAN, A. T., B.SC., 10, Central Mansions, Hendon, London, N.W.4. *z.*
- 1942 GOODSON, A. L., 26, Park Road, Tring, Herts. *l.*
- 1926 GORDON, D. J., B.A., F.R.E.S., Table Office, House of Commons, London, S.W.1. *c, l.*
- 1936 GOWING-SCOPES, E., "Oakhurst," Oakwood Road, Crofton, Orpington, Kent. *l.*
- 1924 GRANT, F. T., 37, Old Road West, Gravesend, Kent. *l, c.*
- 1945 GRANT, JOSEPH HENRY, F.R.E.S., 74, Coleshill Road, Birmingham, 8. *l, ent.*
- 1926 GREY, MRS OLIVE, F.Z.S., 66, Barrington Court, Pages' Hill, London, N.10. *ent.*
- 1946 GUMMER, C. M., 14, Manor Road, Deal, Kent. *l.*
- 1947 HAGGETT, G. M., 1, Torton Hill, Arundel, Sussex. *l, ent.*
- 1945 HAMERTON, J. L., 35, Bodley Road, New Malden, Surrey. *l, od.*
- 1944 HAMMOND, H. E., F.R.E.S., 16, Elton Grove, Birmingham, 27. *l, ent.*
- 1943 HARDS, C. H., F.R.E.S., 40, Riverdale Road, Plumstead, London, S.E.18. *l.*
- 1902 HARE, E. J., F.R.E.S., Harrow Place, Pinden, Dartford, Kent. *l.*
- 1943 HARPER, Comdr. G. W., R.N., F.R.E.S., Bramblewood, Bushby Avenue, Rustington, Sussex. *l.*
- 1936 HARRIS, W. H. A., 48, Corringway, London, W.5. *l.*
- 1924 HARWOOD, P., F.R.E.S., Ardinsh, Kinraig, Inverness-shire, N.B. *l, c.*
- 1927 HAWGOOD, D. A., 2, Kingsmead Road, Tulse Hill, London, S.W.2. *l.*
- 1924 HAWKINS, Capt. C. N., F.R.E.S., Council, 23, Wilton Crescent, Wimbledon, London, S.W.19. *l, c, g.*
- 1929 HAWLEY, Lt.-Col. W. G. B., D.S.O., F.R.E.S., "Amber Cottage," Bodenham, near Salisbury, Wilts. *l.*

YEAR OF
ELECTION.

- 1943 HAYNES, H., 6, Nelson Road, Salisbury, Wilts. *l.*
- 1938 HAYNES, R. F., "The Sanctuary," Burney Road, West Humble, Dorking, Surrey. *l.*
- 1923 HAYWARD, Capt. K. J., F.R.E.S., F.Z.S., F.R.G.S., Instituto Miguel Lillo, Calle Miguel Lillo, 205, Tucuman, Republica Argentina. *l, orn, c.*
- 1945 HEATH J., F.R.E.S., "Heathcot," Hedge End, Southampton. *l.*
- 1935 HEDGES, A. V., F.R.E.S., "Ballavale," Santon, Isle of Man. *l.*
- 1920 HEMMING, A. FRANCIS, C.M.G., C.B.E., F.Z.S., F.R.E.S., 83, Fellows Road (Garden Flat), Hampstead, London, N.W.3. *l.*
- 1924 HENDERSON, J. L., *Hon. Treasurer*, 6, Haydn Avenue, Purley, Surrey. *c.*
- 1945 HESLOP, Mrs E. A., 12, Inglis Road, Southsea, Hants. *l.*
- 1931 HESLOP, I. R. P., M.A., F.R.E.S., c/o Messrs Griffiths and McAlister, 10, Warwick Street, Regent Street, London, W.1. *l.*
- 1946 HEWSON, F., F.R.E.S., 23, Thornhill Drive, Gaisby, Shipley, Yorks. *l, hym parasitica.*
- 1937 HICK, E. PENTLAND, F.R.E.S., F.Z.S., "Athol House," Fulford Road, Scarborough, Yorks. *l.*
- 1945 HINTON, H. E., B.SC., PH.D., F.R.E.S., British Museum (Natural History), South Kensington, London, S.W.7.
- 1944 HITCHINS, Capt. P. E. N., B.SC., Sicklebank, Horam, Sussex. *ent.*
- 1944 HODGSON, S. B., 5, Charles Street, Berkhamstead, Herts. *l.*
- 1943 HOLLEBONE, Comr. L. H. T., O.B.E., R.N., 74, Kensington Court, Kensington, London, W.8.
- 1946 HOLROYD, GEORGE C., The Matchbox, 8, Elmside, Onslow Village, Guildford, Surrey. *l.*
- 1945 HOWARD, A. P., 19, Limes Avenue, Mill Hill, London, N.W.7. *ent.*
- 1927 HOWARD, J. O. T., M.A., *Council*, 551A, Finchley Road, London, N.W.3. *l.*
- 1931 HOWARTH, T. G., B.E.M., F.R.E.S., *Council*, 66, St John's Road, Sevenoaks, Kent. *l.*
- 1934 HUGGINS, H. C., F.R.E.S., 875, London Road, Westcliff-on-Sea, Essex. *l, ent.*
- 1929 HUGHES, ARNOLD W., 16, Buckingham Way, Wallington, Surrey. *l.*
- 1939 HULLS, L. G., F.C.S., F.R.M.S., F.R.E.S., "Rax," Chidham, near Chichester, Sussex. *ent.*
- 1947 HUMPHREY, S. W., Pear Tree House, Roade, Northamptonshire. *l, rh. (Life Member.)*
- 1938 HUMPHREYS, J. A., 132, High Street, Epsom, Surrey. *l.*
- 1946 HURTER, D. G., 41, Garston Old Road, Liverpool, 19. *l.*
- 1933 HUTCHINGS, H. R., 127, Chadacre Road, Stoneleigh, Surrey. *l.*
- 1928 JACKSON, F. W. J., "The Pines," Ashted, Surrey.

YEAR OF
ELECTION.

- 1940 JACKSON, Capt. REGINALD A., R.N., F.R.E.S., *Vice-President*, "The Hermitage," Bishops Waltham, Hants, and the Junior United Services Club, London, S.W.1. *ent, l.*
- 1945 JACKSON, W. H., Northroak Cottage, Lyndhurst, Hants. *l.*
- 1923 JACOBS, S. N. A., *Council*, "Ditchling," 54, Hayes Lane, Bromley, Kent. *l, e l.*
- 1936 JAMES, W. H., 41, Carson Road, Dulwich, London, S.E.21. *l.*
- 1928 JANSON, O. J., F.R.E.S., *Recorder*, 15, Kingshill Crescent, St Albans, Herts, or 46, Beresford Road, Hornsey, London, N.8. *ent.*
- 1942 JAQUES, J. M., 12, Coulsdon Road, Coulsdon, Surrey. *l.*
- 1925 JARVIS, C. MACKECHNIE, F.L.S., 50, Adelaide Square, Bedford. *c.*
- 1938 JARVIS, F. V. L., B.SC., 21, Shirley Avenue, Sutton, Surrey. *l, g.*
- 1945 JOHNSON, Col. G. F., D.S.O., Castlesteads, Brampton, Cumberland. *l.*
- 1947 JONES, Mrs E. D., 40, Glenlyon Road, London, S.E.9. *b, nat. hist.*
- 1946 KAUFMANN, R. R. U., Jodrell Hall, Holmes Chapel, Cheshire. *c.*
- 1946 KEMP, J. K. C., Perrymead House, Bath, Somerset. *l.*
- 1943 KERSHAW, Col. S. H., D.S.O., Alderman's Place, Aspley Heath, Bletchley, Bucks. *l.*
- 1928 KETTLEWELL, H. B. D., M.A., M.B., B.CHIR., M.R.C.S., L.R.C.P., F.R.E.S., "Homefield," The Common, Cranleigh, Surrey. *g, l.*
- 1910 KIDNER, A. R., "Whitelea," Fitzgerald Avenue, Seaford, Sussex. *l.*
- 1925 KIMMINS, D. E., R.A.F., 6, St John's Road, Penge, London, S.E.20. *l, n.*
- 1933 KING, H., D.SC., F.R.S., "Gavarnie," Wise Lane, Mill Hill, London, N.W.7. *l, orn.*
- 1947 KLIMESCH, J., Donatusgasse 4, Linz-a-Donau, Austria. *ml.*
- 1944 KLOET, G. S., F.Z.S., F.R.E.S., 8, Knutsford Road, Wilmslow, Cheshire. *ent.*
- 1925 LABOUCHERE, Lt.-Col. F. A., F.R.E.S., *Council*, 15, Draycott Avenue, Sloane Square, London, S.W.3.
- 1945 LANG, R. M., A.C.A., 9, Tabor Gardens, Cheam, Surrey. *l.*
- 1941 LAST, H. R., *Council*, 12, Winkworth Road, Banstead, Surrey. *c, l.*
- 1946 LATHAM, F. H., 26, Hollie Lucas Road, Birmingham, 4. *l.*
- 1927 LAWSON, H. B., F.R.E.S., "Churchmead," Pirbright, Surrey. *l.*
- 1914 LEEDS, H. A., Wood Walton, Huntingdon. *l.*
- 1946 LETTS, A. W., F.R.E.S., 44, Overton Road, Sutton, Surrey. *l, hym.*
- 1947 LEWIS, E., 8, Parry Road, South Norwood, London, S.E.25. *c.*
- 1934 LINE, H. V., 11, Priory Avenue, Petts Wood, Orpington, Kent. *l.*
- 1933 LIPSCOMB, Lt.-Col. C. G., Misterton, Somerset. *l.*
- 1937 LISNEY, A. A., M.A., M.B., F.R.E.S., The Red House, Narborough, Leicester. *l.*

YEAR OF
ELECTION.

- 1942 LLOYD, Major C. T., D.SC., PH.D., F.R.E.S., 25, Belmont Avenue, New Malden, Surrey. *l*.
- 1935 LOWE, Lt.-Col. J. H. B., R.E., c/o Lloyds Bank Ltd., Cox's & King's Branch, 6, Pall Mall, London, S.W.1. *l*.
- 1931 MACNULTY, B. J., "Sherwood," Chester Road, Old Hartford, Cheshire. *l*.
- 1945 MANLEY, Lt.-Col. W. B. L., The Guards Club, London, W.1. *ent*.
- 1945 MANLY, G. B., 72, Tenbury Road, King's Heath, Birmingham, 14. *ent, l*.
- 1932 MARCON, Rev. J. N., Christ Church Vicarage, Seaside, Eastbourne, Sussex. *l*.
- 1930 MARSH, Capt. DUDLEY G., Gara-Tor, Pigeon Lane, Eddington, Nr. Herne Bay, Kent. *l*.
- 1922 MASSEE, A. M., D.SC., F.R.E.S., East Malling Research Station, Kent. *l*.
- 1943 MATTHEWS, J. K., M.A., Greystoke, Freshfield, near Liverpool. *l, b, orn*.
- 1946 MELLOWS, CHARLES, Alliot House, The College, Bishops Stortford, Herts. *l, hym*.
- 1932 MELLOWS, W. T., M.B.E., LL.B., "The Vineyard," Minster Precincts, Peterborough, Northants. *l*.
- 1946 MERE, R. M., Pembroke Lodge, Steepways, Hindhead, Surrey. *l*.
- 1942 METCALFE, PERCY, C.V.O., R.D.I., A.R.C.A., 70, Madrid Road, Barnes, London, S.W.13. *l*.
- 1945 MICHAUD, J., PH.D., 22, Routh Road, London, S.W.18. *ent*.
- 1945 MILNE-REDHEAD, E., 7, Ashley Gardens, Petersham, Richmond, Surrey. *c*.
- 1943 MILTON, P. W., 23, Woodstock Road, Carshalton, Surrey. *c, ent*.
- 1938 MINNION, W. E., 57, Lloyd Court, Pinner, Middlesex. *l*.
- 1944 MOODY, NORMAN H., 119, Southampton Road, Ringwood, Hants. *ent, orn*.
- 1946 MOORE, B. P., B.SC., F.R.E.S., The University, Sheffield, 10. *od, l*.
- 1945 MOORE, JOHN W., F.R.E.S., Middleton Dene, 151, Middleton Hall Road, King's Norton, Birmingham, 30. *erh*.
- 1920 MORISON, G. D., B.SC., PH.D., F.R.E.S., Dept. Advisory Entomology, N. of Scotland Agricultural College, Marischal College, Aberdeen, N.B. *ec, ent*.
- 1930 MORLEY, A. M., O.B.E., M.A., F.R.E.S., 9, Radnor Park West, Folkestone, Kent. *l*.
- 1945 MORRELL, H. A., *Council*, 63, Salisbury Avenue, Cheam, Surrey. *l*.
- 1937 MORTIMER, D. A., 31, Junction Street, Dudley, Worcs. *hym*.
- 1940 MORTIMER, Mrs D. A., 31, Junction Street, Dudley, Worcs. *ent*.
- 1937 MOWBRAY, M. J., 10, Carisbrooke Road, St Leonards, Sussex. *ent*.
- 1935 MULLER, Miss I. M., "Appledore," Mugswell, Chipstead, Surrey. *ent*.

YEAR OF
ELECTION.

- 1945 MURRAY, Rev. D. P., The Priory, Wellington Street, Leicester. *l*.
 1946 NEWELL, L. R. H., 16, Vermont Road, Sutton, Surrey. *ent*.
 1926-36 and 1945 NEWMAN, L. HUGH, F.R.E.S., Chestnut House, Cold
 Blow, Bexley, Kent. *l*.
 1945 NEWTON, J. L., M.R.C.S., L.R.C.P., Alconbury Hill, Huntingdon.
l, b.
 1930 NIBLETT, M., F.R.E.S., 10, Greenway, Wallington, Surrey. *galls*.
 1938 ODD, D. A., "Havenhurst," 5, Robin Hood Lane, Sutton, Sur-
 rey. *l*.
 1932 O'FARRELL, A. F., B.SC., A.R.C.S., F.R.E.S., 90, Woodwarde Road,
 Dulwich, London, S.E.22. *od, cr, ent*.
 1934 OLIVER, G. B., Harefield Road, Luton, Beds. *l*.
 1943 OLIVER, G. H. B., "Corydon," Amersham Road, Hazlemere,
 High Wycombe, Bucks. *l*.
 1945 OWEN, GODFREY V., Orford, 63, Manor Park Road, West Wick-
 ham, Kent. *l*.
 1927-37 and 1946 PALMER, D. S., Hillside Lodge, Ridgeway, Horsell,
 Woking, Surrey. *ent*.
 1942 PARFITT, R. W., 4, Brind Park Terrace, Sandhurst, Camberley,
 Surrey. *l*.
 1946 PARMENTER, Capt. L., F.R.E.S., 94 Fairlands Avenue, Thornton
 Heath, Surrey. *d*.
 1945 PARSONS, I. D., The Old School, Broxbourne, Herts. *l*.
 1940 PAYNE, L. G., 22, Marksbury Avenue, Richmond, Surrey. *c*.
 1940 PAYNE, R. M., 22, Marksbury Avenue, Richmond, Surrey. *c, od,*
orth, b. (Life Member.)
 1940 PELHAM-CLINTON, EDWARD C., R.A., Trebles Holford, Bishops
 Lydeard, near Taunton, Somerset. *l*.
 1928 PERKINS, J. F., B.SC., F.R.E.S., 95, Hare Lane, Claygate, Sur-
 rey. *hym*.
 1944 PERRY, K. M. P., 21, Cornwall Road, Cheam, Surrey. *c*.
 1946 PHELPS, C. C., M.B.E., 2, Gonville House, Manor Fields, Putney
 Hill, London, S.W.15. *l*.
 1945 PHILPOTT, V. W., "Glenthorne," Old Castle Road, Weymouth,
 Dorset. *l*.
 1944 PICKARD, JAMES N., PH.D., M.A., F.R.S.E., Craufurd, Mill Lane,
 Sawston, Cambs. *l, g*.
 1947 PINN, C. G., 34, Lawn Road, Eastleigh, Hants. *nat. hist, orn, l*.
 1933 PINNIGER, E. B., F.R.E.S., Dalegarth, 5, Endlebury Road, Ching-
 ford, London, E.4. *od, n, l*.
 1943 PITMAN, C. M. R., "Malvern," Southampton Road, Clarendon,
 Salisbury, Wilts. *l, orn, b, etc*.
 1946 PLAYFORD, F. L., c/o 12, Church Street, Harwich, Essex. *r*.
 1945 PRATT, C. BIGNELL, 1, West Ham Lane, Stratford, London, E.15.
ent.
 1924 PRIEST, C. G., 5, Kensal Road, Paddington, London, W.10. *l*.

YEAR OF
ELECTION.

- 1947 PROCTER, R., 7, Chantriell Grove, York Road, Leeds, 9. *l*.
- 1945 PUREFOY, J. BAGWELL, Ridge House, Broom Close, Esher, Surrey. *l*.
- 1945 QUIBELL, WILLIAM, "Coombs," High Street, Brampton, Huntingdon. *l*.
- 1922 RAIT-SMITH, W., F.Z.S., F.R.E.S., F.R.H.S., "Hurstleigh," Linkfield Lane, Redhill, Surrey. *l*.
- 1946 RANSOME, Major-General A. L., C.B., D.S.O., M.C., The Close, Braishfield, Romsey, Hants. *rh*.
- 1946 RAY, H., Mill House Cottage, Bishopstoke, Hants. *rh*.
- 1945 RICHARDS, O. W., M.A., D.SC., F.R.E.S., Department of Zoology, Imperial College of Science and Technology, South Kensington, London, S.W.7. *ent*.
- 1942 RICHARDSON, AUSTIN, M.A., F.R.E.S., Beaudesert Park, Minchinhampton, Glos. *l*.
- 1920 RICHARDSON, A. W., F.R.E.S., 28, Avenue Road, Southall, Middlesex. *hym*.
- 1936 RICHARDSON, N. A., 20, Bletchley Road, Bletchley, Bucks. *l*.
- 1934 RIDEOUT, J. K., "Hodgsonites," Charterhouse, Godalming, Surrey. *ent*. (*Life Member*.)
- 1945 RILEY, J. A., 7, McKay Road, Wimbledon, London, S.W.20. *l, od*.
- 1908 RILEY, Capt. N. D., F.R.E.S., F.Z.S., 7, McKay Road, Wimbledon, London, S.W.20. *l*.
- 1910 ROBERTSON, G. S., M.D., "Struan," Storrington, near Pulborough, Sussex. *l*.
- 1946 ROBINSON, B. H. B., "St Martins," 35, Woodcote Hurst, Epsom, Surrey. *l, c*.
- 1946 ROCHE, C. G., 38, Saxmumdharn Road, Aldeburgh, Suffolk. *hym*.
- 1942 ROCHE, P. J. L., M.R.C.S., L.R.C.P., F.R.E.S., c/o D.M.S., Lagos, Nigeria. *c, hem, e l*.
- 1935 ROYFFE, D. W., 99, Hughenden Road, High Wycombe, Bucks. *c, ent*.
- 1932 RUDLAND, W. L., F.R.E.S., 16, Mansfield Road, Reading, Berks. *l*.
- 1947 RUMSEY, F., 46, Warren Road, Banstead, Surrey. *l*.
- 1932 RUSSELL, A. G. B., C.V.O., F.R.E.S., Lancaster Herald, "Scarbank," Swanage, Dorset. *l*.
- 1890-93 and 1915 RUSSELL, S. G. CASTLE, Stokesay, Bridge Road, Cranleigh, Surrey. *l*.
- 1908 ST AUBYN, JOHN, F.R.E.S., F.R.P.S., 14, Purley Knoll, Purley, Surrey. *l, mi*.
- 1946 SAUNDBY, Air-Marshals Sir ROBERT H. M. S., K.B.E., C.B., M.C., D.F.C., A.F.C., Oxleas, Burghclere, near Newbury, Berks. *l*.
- 1945 SAUNT, J. W., A.L.S., 65, Victoria Road, East Cowes, I.O.W. *hym, ent*.
- 1927 SCOTT, Col. E., M.B., "Hayesbank," Ashford, Kent. *l*.
- 1946 SELF, K. W., "Theydon," Sarum Road, Winchester, Hants. *ent*.

YEAR OF
ELECTION

- 1923 SEVASTOPULO, D. G., F.R.E.S., c/o Ralli Bros., Ltd., 25, Finsbury Circus, London, E.C.2. (*Life Member.*) *l.*
- 1933 SHARMAN, F. W., 183, Star Road, Peterborough, Northants. *l.*
- 1945 SHAW, H. K. AIRY, B.A., F.R.E.S., Royal Botanic Gardens, Kew, Surrey. *c, hem.*
- 1947 SHORT, H. G., M.SC., Corriegarth, Queen's Road, Teddington, Middlesex. *l.*
- 1939 SIVITER SMITH, P., F.R.E.S., 21, Melville Hall, Holly Road, Edgbaston, Birmingham, 16. *l.*
- 1941 SMITH, Lieut. FDK. WM., R.N.V.R., Boreland-of-Southwick, by Dumfries, Kirkcudbright. *l, hym. (Life Member.)*
- 1945 SMITH, F/Lt. M. W. P., 21, Shaftesbury Avenue, Bedford. *l.*
- 1920-25 and 1939 SMITH, S. GORDON, F.L.S., F.R.E.S., "Estyn," Boughton, Chester. *ent.*
- 1938 SNELL, B. B., F.R.E.S., "Woodsome," Bromborough, Cheshire. *l.*
- 1945 SOUTHGATE, B. J., F.R.H.S., 42, Ruxley Lane, West Ewell, Surrey. *c, hem.*
- 1946 SOUTHWOOD, T. R. E., Parrock Manor, Gravesend, Kent. *hem, c.*
- 1945 SPARROW, Mrs M. J., 1, Anne Boleyns Walk, Cheam, Surrey. *l.*
- 1926-29 and 1941 SPARROW, R. W., M.INST.R.A., 134, Regents Park Road, London, N.3. *l.*
- 1947 SPERRING, A. H., Slindon, Fifth Avenue, Warblington, Hants. *l.*
- 1943 SPREADBURY, W. H., 35, Acacia Grove, New Malden, Surrey. *nat. hist.*
- 1920-32 and 1938 STAFFORD, A. E., "Corydonis," 83, Colborne Way, Worcester Park, Surrey. *l.*
- 1927 STANLEY-SMITH, F., F.R.E.S., *Hon. Secretary*, "Hatch House," Pilgrims' Hatch, Brentwood, Essex. *l.*
- 1937 STEDALL, H. P. P., "Cherry Cottage," Prestwood, Great Missenden, Bucks. *ent.*
- 1940 STEEL, W. O., Redlands, Maidenhead Court, Maidenhead, Berks. *c.*
- 1938 STERLING, D. H., 36, Estella Avenue, New Malden, Surrey. *l.*
- 1942 STIDSTON, Eng. Capt. S. T., R.N., F.R.E.S., "Ashe," Ashburton, Devon. *l.*
- 1936 STIGANT, Miss B., Flat 6, 99, Crawford Street, London, W.1. *hortic. ent.*
- 1924 STOREY, W. H., Fairstead, Long Road, Cambridge. *ent.*
- 1945 STOUGHTON-HARRIS, G., M.A., F.C.A., F.R.E.S., 11, Langdale Close, Bury Lane, Horsell, Woking, Surrey. *ent.*
- 1931 STOVIN, G. H. T., M.R.C.S., L.R.C.P., 36, Wymondley Road, Hitchin, Herts.
- 1929 STUBBS, G. C., The Hall, Portishead, Somerset.
- 1939 SUMMERS, E. J., 30, Sutton Court Road, Sutton, Surrey. *c, hem.*
- 1934 SUTTON, GRESHAM R., 6, Kenilworth Gardens, Loughton, Essex. *l, c.*
- 1945 SUTTON, R., 20, Ongar Road, Fulham, London, S.W.6. *l.*

YEAR OF
ELECTION.

- 1943 SWANN, E. L., 282, Wootton Road, King's Lynn, Norfolk. *c.*
- 1916 SYMS, E. E., F.R.E.S., F.Z.S., *Hon. Librarian*, 22, Woodlands Avenue, Wanstead, London, E.11. *n, orth, od, t.*
- 1946 TALBOT, G., F.R.E.S., 31, York Road, Woking, Surrey. *ent.*
- 1942 TALBOT, M. J. R., c/o The Foreign Office, S.W.1. "By Beirut Bag." *l.*
- 1913 TATCHELL, L. S., F.R.E.S., "Rockleigh Cottage," Swanage, Dorset. *l.*
- 1941 TAYLOR, H. G. W., 11, Granville Road, Sidcup, Kent. *c.*
- 1934 TAYLOR, J. O., 64, Great Thrift, Petts Wood, Kent. *l.*
- 1925 TAYLOR, J. SNEYD, M.A., F.R.E.S., P.O. Box 23, Fort Beaufort, Cape-Province, Union of S.A. *l.*
- 1929-37 and 1938 TETLEY, J., "White Cottage," Silverlea Gardens, Horley, Surrey. *ent.*
- 1931 THOMPSON, J. ANTONY, F.R.E.S., Sulby Hall, Welford, near Rugby, Staffs. *l, g.*
- 1946 THORPE, JOHN, F.R.E.S., 11, Egghill Lane, Northfield, Birmingham, 31. *l, c, b.*
- 1945 TIMMS, C., F.R.E.S., 524a, Mosely Road, Birmingham, 12. *d.*
- 1937 TONGE, A. E., F.R.E.S., "Ashville," Trafford Road, Alderley Edge, Cheshire. *l.*
- 1934 TUNSTALL, H. G., 11, St James Avenue, Ewell, Surrey. *l.*
- 1940 TURNER, A. D., 19, Manor Close, Kingsbury, London, N.W.9. *ent.*
- 1944 TURNER, H. J., 33, Pine Avenue, W. Southbourne, Nr. Bournemouth, Hants. *l.*
- 1943 TURNER, J. FINCHAM, 17, Litchfield Avenue, Morden, Surrey. *l, hym.*
- 1945 VALENTINE, ARTHUR, 2, Vicars Close, Wells, Somerset. *ent.*
- 1929-31 and 1944 WAINWRIGHT, CHARLES, B.Sc., F.R.I.C., 216, St Bernards Road, Olton, Warwickshire. *l.*
- 1929 WAINWRIGHT, J. CHAS., 9, Priory Road, Hook Road, Surbiton, Surrey. *l.*
- 1911 WAKELY, Sir LEONARD D., K.C.I.E., C.B., *Vice-President*, 37, Marryat Road, Wimbledon, London, S.W.19. *l.*
- 1930 WAKELY, S., 36, Stradella Road, Herne Hill, London, S.E.24. *l.*
- 1946 WALKER, J. A., M.B., B.S., The Old Cottage, Burley Street, Burley, Hants. *l, ml.*
- 1935 WALLIS-NORTON, Capt. S. G., 2 Victoria Mansions, Eastbourne, Sussex. *ent. (Life Member.)*
- 1944 WALTON, ANTHONY M., F.R.E.S., 275, Croxted Road, West Dulwich, London, S.E.21, and Hertford College, Oxford. *l.*
- 1936 WARRIER, R. EVERETT, 147, Friern Road, London, S.E.22. *l.*
- 1939 WATKINS, N. A., M.A., F.R.E.S., Soldon, Druid Road, Stoke Bishop, Bristol, Glos., 9. *l.*
- 1945 WATKINS, O. G., F.R.E.S., 20, Torr View Avenue, Peverell, Plymouth, Devon. *l, od.*

YEAR OF
ELECTION.

- 1920 WATSON, D., "Crossways," Hightown, Ringwood, Hants. *l*.
- 1945 WATSON, R. W., South Haven, Stanley Road, Lymington, Hants. *l*.
- 1945 WEBB, HARRY E., 20, Audley Road, Hendon, London, N.W.4. *l*.
- 1945 WEDDELL, B. W., 13, The Halve, Trowbridge, Wilts. *ent*.
- 1928 WELLS, CLIFFORD, "Dial House," Crowthorne, Berks. *l*.
- 1911 WELLS, H. O., "St Hilary," 4, Boleyn Avenue, East Ewell, Surrey. *l*.
- 1937 WELTI, A., F.R.E.S., 5, Oakley Road, Upper Warlingham, Surrey. *l*.
- 1947 WEST, B. K., Branksea, 193, Shepherd's Lane, Dartford, Kent. *l*.
- 1945 WHEELER, A. S., 11, The Chase, Coulsdon, Surrey. *l*.
- 1911 WHEELER, The Rev. G., M.A., F.Z.S., F.R.E.S., "Ellesmere," Gratwicke Road, Worthing, Sussex. *l*.
- 1927 WHITE, A. GRANVILLE, F.C.A., "Hilltop," Chaldon, Surrey.
- 1945 WHITE, E. BARTON, M.R.C.S., L.R.C.P., F.R.E.S., St Merryn, Braunton, N. Devon. *l*.
- 1946 WHITEHORN, K. P., 12, Kingscourt Road, Streatham, London, S.W.16. *l*.
- 1946 WILD, E. H., 28, York Road, Selsdon, Surrey. *l*.
- 1946 WILDRIDGE, W., 12, Church Mede, Frogmore, near St Albans, Herts. *ent*.
- 1947 WILLIAMS, MRS D. M., "Warley Lea," Brentwood, Essex. *l*.
- 1945 WILLIAMS, E. F., F.R.E.S., "Warley Lea," Brentwood, Essex. *l*.
- 1947 WILLIAMS, E. P., "Warley Lea," Brentwood, Essex. *l, od*.
- 1925 WILLIAMS H. B., LL.D., F.R.E.S., "Croft Point," Bramley, Surrey. *l, g*.
- 1932 WILLIAMS, S. W. C., 17, Beresford Road, Chingford, London, E.4. *l*.
- 1938 WILLIS, J. R., "Vine Cottage," West Horsley, Surrey. *l*.
- 1946 WILLSHEE, C. J., 63, Daventry Road, Coventry, Warwickshire. *l*.
- 1945 WOOD, G. J., 72, Lincoln Avenue, Twickenham, Middlesex. *ent*.
- 1946 WOOLLCROFT, J., 42, Holmbury Court, Tooting, London, S.W.17.
- 1926 WOOTTON, W. J., "Wannock Gardens," Polegate, Sussex. *l*.
- 1927 WORMS, The Baron DE, M.A., PH.D., F.R.I.C., F.R.E.S., M.B.O.U., Westcroft, 26, Common Close, Horsell, Woking, Surrey. *l, orn*.
- 1945 WYKES, N. G., Carter House, Eton College, Windsor, Berks. *l*.
- 1944 YGLESIAS, H. R., B.A., 4, College Hill, Cannon Street, London, E.C.4. *l*.
- 1945 YODEN, GEORGE N., Vanessa, Shepherdswell, near Dover, Kent. *l*.

Members will greatly oblige by informing the Hon. Secretary of any errors in, additions to, or alterations required in the above addresses and descriptions.

Check List of Members arranged under Country, County and Town in Alphabetical Order.

ENGLAND.

BEDS.

Bedford.

Jarvis, C. MacK.

Smith, M. W. P.

Luton.

Oliver, G. B.

BERKS.

Cookham Dean.

Crow, P. N.

Crowthorne.

Wells, C.

Maidenhead.

Steel, W. O.

Newbury.

Saundby, R.

Reading.

Corbet, A. S.

Dolton, H. L.

Rudland, W. L.

Windsor.

Wykes, N. G.

BUCKS.

Aylesbury.

Doubleday, B. S.

Bletchley.

Cripps, C. H.

Kershaw, S. H.

Richardson, N. A.

Great Missenden.

Stedall, H. P. P.

High Wycombe.

Oliver, G. H. B.

Royffe, D. W.

CAMBS.

Cambridge.

Darby, D. A.

Storey, W. H.

Sawston.

Pickard, J. N.

Wisbech.

Elgood, W. S.

CHESHIRE.

Alderley Edge.

Crabtree, B. H.

Tonge, A. E.

Bromborough.

Snell, B. B.

Chester.

Smith, S. G.

Holmes Chapel.

Kaufmann, R. R. U.

Northwich.

Crewdson, R. C. R.

Old Hartford.

MacNulty, B. J.

Wilmstow.

Kloet, G. S.

CUMBERLAND.

Brampton.

Johnson, G. F.

Carlisle.

Day, F. H.

DEVON.

Ashburton.

Stidston, S. T.

Braunton.

White, E. B.

Plymouth.

Watkins, O. G.

DORSET.

Swanage.

Russell, A. G. B.

Tatchell, L. S.

Weymouth.

Philpott, V. W.

ESSEX.

Brentwood.

Stanley-Smith, F.

Williams, E. F.

Williams, D. M.

Williams, E. P.

Harwich.

Playford, F. L.

Hutton.

Friedlein, A. F. E.

Loughton.

Sutton, G. R.

Upminster.

Burnell, C. M.

Westcliff-on-Sea.

Huggins, H. C.

Woodford Wells.

Main, H.

GLOUCS.

Bristol.

Ellison, R. E.
Watkins, N. A.

Minchinhampton.

Richardson, A.

HANTS.

Barton-on-Sea.

Burton, M. (Miss).
Burton, R. J.

Basingstoke.

Goodliffe, F. D.

Bishopstoke.

Ray, H.

Bishops Waltham.

Jackson, R. A.

Bournemouth.

Brown, S. C. S.
Carr, F. M. B.
Curtis, W. P.
Turner, H. J.
Wainwright, C. J.

Burley.

Walker, J. A.

Eastleigh.

Pinn, C. G.

Gosport.

Burns, B. S.

Lymington.

Watson, R. W.

Lyndhurst.

Jackson, W. H.

Micheldever.

Dixon, C. H.

Ringwood.

Moody, N. H.
Watson, D.

Romsey.

Ransome, A. L.

Southampton.

Fassnidge, W.
Heath, J.

Southsea.

Heslop, E. A. (Mrs).

Warblington.

Sperring, A. H.

Winchester.

Ffennell, D. W. H.
Self, K. W.

IIERTS.

Berkhamsted.

Bell, J. H.
Bell, P. J.
Hodgson, S. B.

Bishops Stortford.

Crauford, C.
Mellows, C.

Broxbourne.

Parsons, I. D.

Hertford.

Champion, C. C.

Hitchin.

Stovin, G. H. T.

Letchworth.

Bowden, S. R.

St Albans.

Edwards, G. G.
Janson, O. J.
Wildridge, W.

Tring.

Cockayne, E. A.
Goodson, A. L.

HUNTS.

Alconbury Hill.

Newton, J. L.

Brampton.

Quibell, W.

Wood Walton.

Leeds, H. A.

I. OF MAN.

Santon.

Hedges, A. V.

I.O.W.

Cowes, East.

Saunt, J. W.

Freshwater.

Blair, K. G.

KENT.

Ashford.

Scott, E.

Bexley.

Ford, L. T.
Ford, R. L. E.
Newman, L. H.

Bexleyheath.

Crocker, W.

Bromley.

Freeman, J. A.
Jacobs, S. N. A.

Canterbury.

Chalmers-Hunt, M.

Chislehurst.

Blyth, S. F. P.

Dartford.

Hare, E. J.
West, B. K.

Deal.

Gummer, C. M.

Dover.

Gardiner, B. O. C.
Youden, G. N.

East Malling.

Massee, A. M.

Folkestone.

Bostock, E. D.
 Gilliat, F. T.
 Morley, A. M.

Gravesend.

Grant, F. T.
 Southwood, T. R. E.

Herne Bay.

Marsh, D. G.

Orpington.

Gowing-Scopes, E.
 Line, H. V.

Petts Wood.

Taylor, J. O.

Ryarsh.

Fremelin, H. S.

Sandhurst.

Bull, G. V.

Sevenoaks.

Adkin, J. H.
 Busbridge, W. E.
 Howarth, T. G.

Sidcup.

Taylor, H. G. W.

Tankerton.

Atkinson, J. L.
 Fraser, A.

Tonbridge.

Blest, T.

Tunbridge Wells.

Adkin, B. W.

Westerham.

Edwards, R. C.

West Wickham.

Deal, J.
 Evans, B. M.
 Owen, G. V.

LANCS.

Liverpool.

Davidson, A. R.
 Fraser, C. (Miss).
 Fraser, G. de C.
 Fraser, G. de C. (Mrs).
 Hurter, G. G.
 Mansbridge, W.
 Matthews, J. K.

Manchester.

Charlson, S.

Southport.

Cheeseman, C. J.

LEICS.

Leicester.

Murray, D. P.

Narborough.

Lisney, A. A.

LINCS.

Boston.

Bowser, E. W.
 Cooper, B. A.
 Eckford, A.
Market Rasen.
 Court, T. H.

LONDON.

E.4. *Chingford.*

Davis, G. A.
 Forster, H. W.
 Pinniger, E. B.
 Williams, S. W. C.

E.11. *Wanstead.*

Syms, E. E.

E.15. *Stratford.*

Pratt, C. B.

E.C.4. *Cannon Street.*

Yglesias, H. R.

N.3. *Regents Park.*

Sparrow, R. W.

N.8. *Hornsey.*

Janson, O. J.

N.10. *Muswell Hill.*

Eastmure, D. F.

Pages Hill.

Grey, O. (Mrs).

N.15. *S. Tottenham.*

Brooke, W. M. A. (Miss).

N.19. *Holloway Road.*

Buck, F. D.

N.W.3. *Hampstead.*

Balter, R. S.
 Hemming, A. F.
 Howard, J. O. T.

N.W.4. *Hendon.*

Goodman, A. T.
 Webb, H. E.

N.W.6. *Kilburn.*

Fraser, M. G.

N.W.7. *Mill Hill.*

Dunbar, J. G.
 Howard, A. P.
 King, H.

N.W.8. *Regents Park.*

Bushby, L. C.

N.W.9. *Kingsbury.*

Turner, A. D.

N.W.11. *Golders Green.*

Brown, A. G.

S.E.6. *Bellingham.*

Burrows, D. S.

S.E.8. *Deptford.*

Moore, H.

S.E.9.

Eltham.

Blood, B. N.
 Jones, E. D. (Mrs).

S.E.18. *Plumstead.*

Hards, C. H.

S.E.20. *Penge.*

Kimmins, D. E.

S.E.21. *Dulwich.*

James, W. H.

Dulwich (West).

Walton, A. M.

S.E.22. *Dulwich.*

O'Farrell, A. F.

Warrier, R. E.

S.E.24. *Herne Hill.*

Coman, R.

Wakely, S.

S.E.25. *South Norwood.*

Lewis, E.

S.W.1. *Westminster.*

Gordon, D. J.

S.W.2. *Tulse Hill.*

Edwards, T. G.

Hawgood, D. A.

S.W.3. *Chelsea.*

Cork, C. H.

Craske, R. M.

Labouchere, F. A.

S.W.6. *Fulham.*

Sutton, R.

S.W.7. *S. Kensington.*

Hinton, H. E.

Richards, O. W.

S.W.13. *Barnes.*

Metcalfe, P.

S.W.15. *Putney.*

Phelps, C. C.

Roehampton.

Cole, G. A.

S.W.16. *Streatham.*

Christie, L.

Whitehorn, K. P.

S.W.17. *Tooting.*

Wolliscroft, J.

S.W.18. *Wandsworth.*

Michaud, J.

W.1. *Mayfair.*

Manley, W. B. L.

Stigant, B. (Miss).

W.3. *Acton.*

Ballinger, D. E.

W.5. *Ealing.*

Harris, W. H. A.

W.8. *Kenington.*

Hollebone, L. H. T.

W.10. *Paddington.*

Priest, C. G.

W.14. *W. Kensington.*

Astbury, C. F.

Feltham.

Classey, E. W.

Northwood.

Adams, R. W.

Pinner.

Minnion, W. E.

Southall.

Richardson, A. W.

Teddington.

Ferguson, L. F.

Short, H. G.

Twickenham.

Wood, G. J.

NORFOLK.

Clay-next-Sea.

Borrer, C. D.

King's Lynn.

Swann, E. L.

West Runton.

Carter, R. A.

NORTHANTS.

Kettering.

Adams, H. W.

Peterborough.

Mellows, W. T.

Sharman, F. W.

Roads.

Humphrey, S. W.

OXFORD.

Oxford.

Carpenter, G. D. H.

Ford, E. B.

Hamm, A. H.

Walton, A. M.

SOMERSET.

Ashcott near Bridgwater.

Cousins, R. J.

Bath.

Kemp, J. K. C.

Misterton.

Lipscomb, C. G.

Portishead.

Stubbs, G. C.

Taunton.

Pelham Clinton, E. C.

Wells.

Valentine, A.

STAFFS.

Rugby.

Easton, N. T.

Thompson, J. A.

SUFFOLK.

Aldeburgh.

Roche, C. G.

MIDDLESEX.

Enfield.

Eagles, T. R.

SURREY.

Ashtead.

Jackson, F. W. J.

Banstead.

Last, H. R.

Rumsey, F.

Bookham, Great.

Collins, R. J.

Bramley.

Williams, H. B.

Camberley.

Parfitt, R. W.

Carshalton.

Milton, P. W.

Chaldon.

White, A. G.

Cheam.

Finnigan, W. J.

Lang, R. M.

Morrell, H. A.

Perry, K. M. P.

Sparrow, M. J. (Mrs).

Turner, Hy. J.

Chipstead.

Muller, I. M. (Miss).

Claygate.

Perkins, J. F.

Coulsdon.

Denvil, H. G.

Ferrier, W. J.

Jacques, J. M.

Wheeler, A. S.

Coulsdon (Old).

Britten, H.

Cranleigh.

Burkhardt, V. R.

Kettlewell, H. B. D.

Russell, S. G. C.

Croydon.

Duffy, E. A. J.

Dorking.

Ensor, G. A.

Haynes, R. F.

Epsom.

Humphreys, J. A.

Robinson, B. H. B.

Esher.

Brett, G. A.

Brett, K. S. L. F. (Mrs).

Craske, J. C. B.

Purefoy, J. B.

Ewell.

Goodban, B. S.

Tunstall, H. G.

Ewell (East).

Wells, H. O.

Ewell (West).

Southgate, B. J.

Godalming.

Becher, L. E.

Rideout, J. K.

Guildford.

Holroyd, G. C.

Hindhead.

Mere, R. M.

Horley.

Tetley, J.

Horsley (West).

Willis, J. R.

Kew.

Shaw, H. K. A.

Kingston (on Thames).

Buckstone, A. A. W.

Downes, W. E.

Glegg, D. L.

Leigh.

Fairclough, R.

Merton Park.

Coulson, F. J.

Morden.

August, V. E.

Turner, J. F.

New Malden.

Hamerton, J. L.

Lloyd, C. T.

Spreadbury, W. H.

Sterling, D. H.

Ottershaw.

Bretherton, R. F.

Oxted.

Farmer, J. B.

Pirbright.

Lawson, H. B.

Purley.

Bliss, A.

Doudney, S. P.

Henderson, J. L.

St Aubyn, J.

Redhill.

Bunnett, E. J.

Rait-Smith, W.

Reigate.

Chapman, L. M. (Miss).

Richmond.

Milne-Redhead, E.

Payne, L. G.

Payne, R. M.

Selsdon.

Barnett, T. L.

Foster, T. B.

Wild, E. H.

Stoneleigh.

Hutchings, H. R.

Surbiton.

Coates, R. J.

Wainwright, J. C.

Sutton.

Conder, G. M.
 Currie, P. W. E.
 Danby, G. C.
 Jarvis, F. V. L.
 Letts, A. W.
 Newell, L. R. H.
 Odd, D. A.
 Summers, E. J.

Thornton Heath.

Parmenter, L.

Wallington.

Hughes, A. W.
 Niblett, M.

Warlingham (Upper).

Wetti, A.

Weybridge.

Best, A. A.

Wimbledon.

Bradley, J. D.
 Cardew, P. A.
 Ennis, L. H.
 Hawkins, C. N.
 Riley, J. A.
 Riley, N. D.
 Wakeley, L. D.

Woking.

Palmer, D. S.
 Stoughton-Harris, G.
 Talbot, G.
 Worms, The Baron de.

Worcester Park.

Stafford, A. E.

SUSSEX.

Arundel.

Haggett, G. M.

Billingshurst.

Curtis, A. E.

Bognor Regis.

Andrews, H. W.

Brighton.

Banner, J. V.
 Chapman, F. W.
 Field, P. L. W. (Mrs).

Chichester.

Boyce, B.
 Hulls, L. G.

Eastbourne.

Chartres, S. A.
 Marcon, J. N.
 Wallis-Norton, S. G.

Horam.

Hitchins, P. E. N.

Lewes.

Bedford, E. J.

Midhurst.

Goddard, T. D.

Polegate.

Wootton, W. J.

Pulborough.

Robertson, G. S.

Rustington.

Harper, G. W.

St Leonards.

Mowbray, M. J.

Seaford.

Kidner, A. R.

Uckfield.

Embry, B.

Worthing.

Brown, S. H.
 Wheeler, G.

WARWICK.

Birmingham.

Birch, L.
 Evans, L. J.
 Grant, J. H.
 Hammond, H. E.
 Latham, F. H.
 Manly, G. B.
 Moore, J. W.
 Siviter Smith, P.
 Thorpe, J.
 Timms, C.

Coventry.

Wilshee, C. J.

Olton.

Wainwright, C.

Solihull.

Allen, D.
 Carlier, S. E. W.

WILTS.

Salisbury.

Hawley, W. G. B.
 Haynes, H.
 Pitman, C. M. R.

Trowbridge.

Weddell, B. W.

WORCS.

Dudley.

Mortimer, D. A.
 Mortimer, D. A. (Mrs).

YORKS.

Sheffield.

Moore, B. P.

Shipley.

Hewson, F.

Leeds.

Procter, R.

Scarborough.

Hick, E. P.

Wombwell.

Blasdale, P.

IRELAND.

CO DUBLIN.
Monkstown.
 Beirne, B. P.

SCOTLAND.

ABERDEEN.
Aberdeen.
 Morison, G. D.

KIRKCUDBRIGHT.
By Dumfries.
 Smith, F. W.

INVERNESS.
Kincraig.
 Harwood, P.

ABROAD.

EUROPE.
Austria.
 Klimesch, J.

Nigeria.
 Heslop, I. R. P.
 Roche, P. J. L.
Tanganyika.
 Dudbridge, B. J.

ASIA.
Asia Minor.
 Talbot, M. J. R.
India.
 Sevastopulo, D. G.
Saudi Arabia.
 Ellison, R. E.

AMERICA, SOUTH.
Argentina.
 Hayward, K. J.

AFRICA.
Cape Province.
 Taylor, J. S.

AUSTRALIA.
New South Wales.
 O'Farrell, A. F.
Tasmania.
 Couchman, L. E.

COUNCIL'S REPORT FOR 1946-47.

Presented at the 75th Annual General Meeting of the Society, held at Burlington House, Piccadilly, London, W.1., on 22nd January 1947.

Your Council is happy to report another year of progress. Members will be pleased to know that we may look forward to enjoying the continued use of the Rooms of the Royal Society for our meetings. This is largely due to the efforts of our President, Captain R. A. Jackson, R.N. Moreover, in the early part of the year we were allotted the joint use, with the Queckett Microscopical Society, of two rooms in the basement to house our library and collections. A small off-shoot was subsequently added. Our Librarian, Mr Syms, and Curator, Mr Coulson, have been to considerable trouble to arrange our furniture and equipment to the best advantage, and although the situation and size of the rooms leaves something to be desired, the Curator considers that the convenience of access to the cabinets, coupled with the growing richness of the representation in all orders of insects, has encouraged more use of the collections by members than has ever been the case in the past. The acquisition of this space has enabled us to bring in our "Bright Collection" from Oxford, and those two cabinets of Lycaenidae are now accessible with the remainder of our collections. A list, prepared by the Curator, is now available showing exactly where any species of Lepidopteron can be found in the collections.

During the year our membership has steadily increased from the record number of 330 at 31st December 1945 to a total of 387, made up of 3 Honorary, 6 Life, 275 Ordinary, and 103 Country Members, twelve months later. Four members have died during the year, Mr A. W. Dennis, a generous benefactor, in January; Mrs Stanley-Smith, the only lady ever to have served on our Council, in June; the eminent entomologist, Mr F. W. Frohawk, one of our Honorary Members, and that active Kent collector, Mr A. G. Peyton, both in December. Three members resigned during the year while two more resignations take effect from the end of the year.

The new class of members, to be known as Special Life Members, consisting of those who have been members continuously for more than 50 years, comes into existence with the beginning of the new year, and no fewer than seven honoured members enter it at once, namely, Mr B. W. Adkin who joined in 1886, Messrs W. Mansbridge, H. Moore and Colbran J. Wainwright in 1889, Mr A. H. Hamm in 1891, Mr Hugh Main in 1892, and Mr T. L. Barnett in 1896. Two other members have also exceeded 50 years of membership, namely, our Honorary Life President, Mr Hy. J. Turner (1887) and Honorary Member, Major H. S. Fremlin (1886).

The executive officers have continued in office throughout the year, while a number of assistants have been appointed as understudies to them.

Twenty Ordinary Meetings, one less than normal, have been held, at which papers by Messrs Fincham Turner, P. M. Miles, a visitor, W. H. Spreadbury and W. J. Finnigan jointly, Dr Harold King, Col. J. H. B. Lowe, Mr J. Antony Thompson, Dr Harold B. Williams, Messrs R. F. Haynes, S. C. S. Brown, Major H. S. Fremlin, Messrs A. M. Morley and E. J. Bunnett, together with short papers by Miss Brooke, Mr F. D. Buck, and Dr Bull, have been read. All the papers are being published and the thanks of the Society have been accorded to these gentlemen for the work they have put into them. The Epidiascope has been in use on eight occasions. The average attendance at these meetings has been 43, which is the highest since 1938. Owing to the Empire Scientific Conference in June and July, the Royal Society rooms were temporarily unavailable for us, but except for the second June meeting which had to be abandoned, alternative accommodation was very kindly provided for us by the Linnean Society in their premises on the opposite side of the quadrangle. The best thanks of members are due to that Society for its kindness.

The Council considered the time opportune to re-institute, as a social function, the annual dinner which used to be a feature of the Society's year long ago, the last having been held in 1895. It was planned to entertain the principal officers of kindred societies in turn, and the eve of the Annual Exhibition in October was selected as likely to be the most convenient date for our more distant members. The first such dinner was held at Pimm's Restaurant in Bishopsgate on the 25th October, when 109 members with their ladies and visitors sat down to a meal which, considering the times, was not too austere. The principal guests were Professor G. D. Hale Carpenter, the President of the Royal Entomological Society of London, with the Honorary Treasurer, Mr Arthur Welti, and the Honorary Secretary, Captain N. D. Riley; and Mr J. D. Griffith Davies, the Assistant Secretary of the Royal Society, with other officers of that eminent Society. Professor Carpenter replied in an amusing if strictly entomological speech to the toast of "The Guests" which had been proposed by our President. Mr Davies in a farewell speech proposed the toast of "The (South London) Society," to which our Honorary Editor, Mr T. R. Eagles, responded.

The Annual Exhibition was held on these premises on the afternoon of Saturday, 26th October. As the Royal Society Library on the first floor by itself had proved too small, the upper Library of the Geological Society, which continues and opens out of it, was also lent us for the occasion. Our grateful thanks are due to the President and Officers of that Society for the loan of their room. The year having been a poor one for insects, the new exhibits were not so rich or numerous as last year, but numbers were maintained by showing the more interesting of earlier captures. Light refreshments were provided in the ante-room by the Society through an outside caterer. The recorded attendance was 296 as compared with 305 in the previous year.

The Bye-laws were revised and brought up to date at a Special Meeting on the 23rd October.

During the season 19 Field Meetings were organised by Mr Classey, including five at Ashted, led by Messrs Eagles (2) and Coulson (3), to continue the entomological survey of that area. Other meetings (with leaders) were at Oxshott (Mr S. Wakely), Benfleet (Mr C. H. Hards), Brentwood (Mr E. E. Syms), Durfold (Dr B. Kettlewell), Ruislip Woods (Captain M. Fraser), Broadwater Forest (Dr G. V. Bull), Alice Holt Forest (Baron de Worms), Betchworth (Mr S. Wakely), Ash Vale (Mr E. W. Classey), Gomshall (Mr R. W. Parfitt), Scratch Wood (Mr F. D. Buck), Chilworth (Mr R. W. Parfitt), and the two fungus forays Oxshott (Mr W. J. Finnigan) and Mickleham Downs (Mr W. H. Spreadbury). The Durfold meeting was particularly successful, and members were afterwards graciously entertained to tea by Mrs Kettlewell, while Dr Kettlewell generously provided transport both from and to the station. The thanks of the Society are due to them and to the leaders of these meetings.

The Society was represented at the Jubilee Congress of the South Eastern Union of Scientific Societies at Tunbridge Wells by Mr B. W. Adkin, whose report is being printed in the *Proceedings and Transactions*. At the Annual Meeting of the British Association for the Advancement of Science we were represented by Mr E. E. Syms, who made a verbal report of the Presidential Address.

The *Proceedings and Transactions* for 1945/46, consisting of xxix, plus 132 pages with 1 coloured and 10 other plates, was published on 23rd November 1946. They include a paper on the family Psychidae, illustrated by a coloured plate, so continuing our policy of producing at least one illustrated paper each year dealing with the Micro-lepidoptera. We are much indebted to the Royal Society for financial assistance which has made the production of this volume possible. Its allocation of the sum of £125 from the Parliamentary Grants in Aid Fund which it administers removed your Council's anxiety as to how it could continue to meet the high and rising cost of colour plates and of printing.

Among the gifts to the Library during the year your Council must particularly mention the presentation of large numbers of parts of the *Proceedings and Transactions of the Royal Entomological Society of London* by Major H. S. Fremlin and Lt.-Col. F. A. Labouchere; following which our series from 1880 to date was generously completed by the Royal Entomological Society itself. The volumes will now be bound as soon as possible.

The collections have been enriched during the year by a number of the butterflies of tropical Africa presented by Colonel Thorne Thorne through Mr H. B. Lawson; and by blown larvae of many species of Lepidoptera by Messrs R. L. E. Ford and E. W. Classey, and by Mr H. E. Hammond.

The Curator reports that the Uganda Rhopalocera have now been combined with the South African collection of Rhopalocera and that three drawers have been devoted to the continental Heterocera received from Mr S. N. A. Jacobs and Mrs Ashby. The Zygaenids of the latter

donations have been embodied with the Zygaenid collection, which has been re-arranged.

Donations of insects were numerous, including Lepidoptera from Captain R. A. Jackson and Messrs J. O. T. Howard, B. B. Snell, L. T. Ford, J. Fincham Turner, and H. A. Morrell; larvae of Lepidoptera from Messrs H. E. Hammond, E. W. Classey, and R. L. E. Ford, and C. N. Hawkins; Coleoptera from Messrs H. Last, L. G. Payne, C. N. Hawkins, and S. N. A. Jacobs; Diptera and Hymenoptera from Messrs H. W. Andrews and S. N. A. Jacobs; and Hemiptera from Mr F. J. Coulson. The best thanks of the Society are due to these members. During the year the lepidopterous larva collection has been enriched by 54 species not previously represented.

The Hemiptera and Homoptera collections are now being re-arranged and the embodiment of Mr E. E. Green's Tortricidae in our collection has been completed.

The librarian reports that during the year the books have been replaced on the Library shelves and thus again made available for reference and borrowing. The number on loan has gradually risen during the latter part of the year. Additions to the Library by gift have been:—By Professor G. D. Hale Carpenter, *Bionomic Notes on a Colony of Zygaena filipendulae* L.; by Mr M. Niblett, two separates; by Dr G. M. Conder and Mr H. G. Tunstall, R. S. R. Fitter's *London's Natural History*; by Mr J. Sneyd Taylor, *Notes on the Birds of the Van Rynevelde's Irrigation Lake, Graaf Reinet*, and *Notes on the Olive Beetle, Agropistes sexvittatus* Bryant; by the London Natural History Society, a number of Volumes and Parts of the *Canadian Entomologist*; by Mr S. N. A. Jacobs, Leon Lhomme's *Catalogue des Lepidoptères de France et de Belgique*; by the Royal Entomological Society of London, a large number of parts of that Society's *Proceedings and Transactions* (see Council's Report); by Major H. S. Fremlin, the same; by Lt.-Col. F. A. Labouchere, the same; by Mr E. A. J. Duffy, *The Life History of Prionus coriarius* L. (Col. Cerambycidae); by Mr Hugh Main, F. H. Savory's *The Arachnida* and five volumes of the *Histoire Naturelle de la France*; by Miss W. M. A. Brooke, Publications of the Linnean Society of London:—No. 2, *Caprellidea (Amphipoda, Crustacea)* by R. J. Harrison, No. 3, *Gammaridae (Amphipoda)* with key to the Families of the British Gammaridea by D. M. Reid, and No. 4, *Freshwater Bivalves (Corbicula, Sphaerium, Dreissena)* by A. E. Ellis; by Mr R. J. Burton, *The Fauna and Flora of the Ilfracombe District of North Devon* by M. G. Palmer.

By Purchase and Exchange:—Kloet and Hincks, *A Check List of British Insects*; Volume 6 of W. W. Fowler's *Coleoptera of the British Isles*; *The Entomologist*, 1946; *The Entomologist's Monthly Magazine*, 1946; *The Entomologist's Record and Journal of Variation*, 1946; *The Entomological News*, 1946; *Natural History*, New York, 1946; *London Naturalist and Bird Report*, 1944; *British Association for the Advancement of Science*, Volume 3; *South Eastern Naturalist*, 1945; *Essex*

Naturalist, 1946; *Lloydia*, 1946; *Report of the Smithsonian Institute*, 1944; *Transactions of the Connecticut Academy of Arts and Science*, 1945; *Bulletin, Société entomologique de Belgique*; from the Field Museum of Natural History, Chicago, (i) *Sparrows from Mexico*, (ii) *Honey Creeper*, (iii) *Toads from China*, (iv) *Snakes from Salvador*, (v) *Catalogue of Birds of America*, (vi) *A new Subfamily of Beetles parasitic on Animals*, (vii) *Chilopods in the Collection of the Field Museum*, (viii) *Annual Reports, 1941-44*; *Royal Irish Academy*, Vol. 5; *Torquay Natural History Society, Transactions and Proceedings, 1944-45*; *Hastings and East Sussex Naturalist*, 1946; *Buletino del R. Instituto Superiore Agrarico, Portici*; *Zoologiska, Bidraga*, Band xxiii.

TREASURER'S REPORT, 1946.

It is gratifying to me to give a far more satisfactory Report of the Society's finances than I was able to a year ago. Our income from all sources has exceeded the expenditure properly chargeable to the year 1946 by £75.

First of all I would thank those Members who have acquired the pleasing habit of making some addition to their proper subscription which goes to augment whichever of our Special Funds they care to specify, or to benefit the Society in some other way. I refer to the many amounts, ranging from 2s 6d to £5, which I have received. There are other donations which the Accounts do not disclose in detail, such as Mr Bunnett's contribution of one half of the cost of the illustrations to his paper.

This is the eleventh year in which we have to thank an anonymous giver of £20 for the Illustration Fund. I understand it is the same kind friend every time.

But you will have realised from my opening remark that it would not have been possible to publish more than a small proportion of the matter contained in the 1945-46 *Proceedings* had we not received £125, a Grant in Aid from the Royal Society towards the cost of this issue.

BALANCE SHEET.

The market value of our Investments, which remain the same as last year, was £1287 at 31st December 1946, an appreciation of £76.

The Cash position is much improved, the combined balances being some £8 higher after liquidating the Reunion Supper Account which stood as a liability of £64 4s 6d at 1st January 1946.

INCOME AND EXPENDITURE ACCOUNT.

The Subscription income has increased from £145 7s 6d to £203 12s 6d, and the net yield from Investments is a few shillings more by reason of the lower rate of Income-tax. On the debit side the usual Expenses show only a slight variation and increase, caused in the main by the use of more postage stamps and stationery, and after granting £60 in all to the Special Funds there is left a balance of £9 16s 11d to carry forward, instead of the deficit of £3 11s 3d which we had last year.

CAPITAL ACCOUNT.

The balance here remains unaltered. The record number of Entrance Fees in 1945 is altogether eclipsed by 1946, the total being £7 17s 6d for 63 new Members as against 56.

LIBRARY FUND.

In addition to the Entrance Fees this Fund receives two compositions for Life Membership, viz., £16 16s, and a grant of £10 from Revenue, bringing the balance at the end of the year, after some small purchases, to £64 1s 3d. Our Librarian will certainly need all this when he is able to put in hand the arrears of book-binding which continue to accumulate.

PUBLICATION AND ILLUSTRATION FUNDS.

The closing balances of these Funds are increased by £26 and £9 respectively. Besides the Royal Society's contribution already mentioned, the donations to these Funds were fifteen guineas higher, and £50 in all was granted from Revenue—£20 more than we could manage in the previous year. On the other hand the cost of production has increased nearly 100% over what we had to pay in 1939. I would, therefore, commend these funds to your continued support, so that the important and interesting papers read at our Meetings shall not have become ancient history by the time they appear in print.

My Books and Accounts have been audited by Messrs F. J. Coulson and G. Stoughton-Harris, to whom we are much indebted for their trouble.

J. L. HENDERSON, Hon. Treasurer.

INCOME AND EXPENDITURE ACCOUNT—Year ended 31st December 1946.

Rent of Rooms ...	£37 0 6	Subscriptions (Arrears and Current) ...	£203 12 6
Insurance ...	3 8 6	Interest—	
Cleaning and Gratuities ...	4 0 0	£154 14s 0d 4% Consols ...	£6 3 8
Secretarial Expenses ...	41 19 1	£591 15s 3d 3½% Conversion Stock ...	20 14 2
Treasurer's Expenses ...	4 3 6	£100 0s 0d 3% Defence Bonds ...	3 0 0
Delivery of "Bright" Collection ...	5 0 0	Deposit Interest ...	1 9 10
Bye-Law Revision Circular ...	17 19 0		£31 7 8
Wreath, Mrs Stanley-Smith ...	2 2 0	Less Income Tax ...	15 1 8
	£115 12 7		16 6 0
Subscriptions to South Eastern Union of Scientific Societies, Wicken Fen Fund, Footpaths Preservation Society, and Ramblers' Association			
Annual Exhibition Expenses ...	2 14 0		
Reunion Supper Account Deficit ...	19 10 0		
Annual Dinner Account Deficit ...	0 3 6		
Grant to Library Fund ...	12 1 6		
Grant to Publication Fund ...	40 0 0		
Grant to Illustration Fund ...	35 0 0		
Balance being Excess of Income over Expenditure carried to Balance Sheet ...	15 0 0		
	9 16 11		
	£219 18 6		£219 18 6

CAPITAL ACCOUNT—Year ended 31st December 1946.

Transfer to Library Fund ...	£7 17 6	Balance at 1st January 1946 ...	£1084 5 11
Balance at 31st December 1946 ...	1084 5 11	Entrance Fees ...	7 17 6
	£1092 3 5		£1092 3 5

LIBRARY : FUND—Year ended 31st December 1946.

[illegible]

PUBLICATION FUND—Year ended 31st December 1946.

Printing and Posting Transactions"	£146 19 3
Balance at 31st December 1946	28 13 7
<hr/>	
Balance at 1st January 1946 ... ..	... ..
Sales of "Proceedings" ... ..	... ..
Donations ... ..	... ..
Interest on 3½% War Stock (Misses E. F. and L. M. Chapman) £10 10s, less Income Tax £5 5s	5 5 0
Grant in Aid from the Royal Society	100 0 0
Grant from Income and Expenditure Account	35 0 0
	<hr/>
	£175 12 10 <hr/>

ILLUSTRATION FUND—Year ended 31st December 1946.

[illegible]





P. M. BRIGHT, F.R.E.S.

A SHORT ACCOUNT OF "THE BRIGHT BEQUEST" OF ABERRATIONS AND VARIETIES OF BRITISH LYCAENIDAE WITH BIOGRAPHICAL NOTES ON THE COLLECTOR.

By S. G. CASTLE RUSSELL, Hon. M.I.E.E.

On 7th February 1941, the late Percy M. Bright, J.P., F.R.E.S., died as the result of a collision with a motor vehicle whilst returning from the Bournemouth Cemetery, where he had been to lay flowers on the grave of his wife.

Mr Bright was born in India, and was 78 years of age at the time of his death. His father was a Missionary, but was compelled to resign owing to the inability of his wife to stand the climate. When his son was 8 the family settled at Bournemouth, and the father later founded the firm of Bright & Colson Ltd., now a large concern, with branches in various provincial cities. Ultimately, Mr Bright succeeded his father as head of the business, and for many years prior to his death had been chairman of the board of directors.

He was well known for his religious and charitable work and, as chairman of a Committee of the London Missionary Society, had visited on its behalf Missionary Stations in India, North and South America, the West Indies, Palestine, and the principal Continental cities. He had also been chairman of the Royal Victoria and West Hants Hospital at Boscombe, and collected considerable sums of money for the funds of the hospital, he himself being a generous contributor. He was also very active in municipal affairs and had been Mayor of Bournemouth during the years 1929-30-31, his daughter, Mrs Philip Hardy, acting as Mayoress. On his retirement from the Mayoralty, he was the recipient of handsome gifts from the Town Council and Burgesses. A presentation was also made to him by the President and Committee of the Royal Victoria Hospital, and a ward in the hospital was endowed by the Town Council, to commemorate his services to the town.

His funeral was attended by a large concourse of friends and representatives of all sections of the public, including the Mayor and Corporation of Bournemouth. The service was held at the Richmond Hill Congregational Church, at which he had been a Lay reader and Churchwarden for many years. The writer was acquainted with Mr Bright for over 40 years and appreciated his sincere and upright character, and his wide knowledge. In recent years he had accompanied him on numerous entomological expeditions. He was a keen motorist and no journey was too long for him in quest of local forms of lepidoptera. He was very unassuming and somewhat reserved, except to those who had the privilege of his close friendship. In the home circle his patient devotion to his wife during the long years of her illness showed the real character of the man. He became a member of the South London Entomological and Natural History Society in 1890, resigning in 1900, but rejoining in 1909,

and he frequently attended the meetings. His exhibits of portions of his Collection, especially at the Annual Exhibitions, will be remembered by those who saw them. He was admitted into the Royal Entomological Society in 1894.

He was a man of many interests, and formed a remarkable collection of postage stamps, and was a well-known philatelic expert; he founded the firm of Bright & Son, Strand, London, which became world famous in the stamp market. He was also an acknowledged expert on antiques, and his residence at Bournemouth was full of beautiful and artistic furniture, china and glass, etc. He had considerable horticultural knowledge and the gardens surrounding his residence were planted with flowering shrubs and plants, the blossoms of which are favoured by lepidoptera, and in the autumn attracted large numbers of the *Vanessidæ*.

It is, however, with his entomological interest that we are most concerned. He was an enthusiastic and observant field collector for some 50 years, and during that period by his own efforts, and by purchase, he acquired a marvellous collection of British lepidoptera, specialising in aberrations, varieties, and local forms. He regularly attended the entomological sales held at Steven's Rooms in Covent Garden, and competed keenly with Dr Mason, Lord Rothschild, Sir Vauncey Harpur Crewe, Percy Webb, A. B. Farn, Arthur Horne, J. A. Clark, H. Massey, B. H. Crabtree, and others who were also forming collections of British Lepidoptera. Ultimately he accumulated a Collection that was generally admitted to be without a rival. Some years ago the portion of the Collection comprising the Heterocera was passed to Lord Rothschild, and is now at the National Museum at Tring. Subsequently he confined his attention to the Rhopalocera. During his visits abroad he made a representative collection of Foreign butterflies which was sold at his death.

Mr Bright was very much interested in the *Lycaenidae* and many years ago conceived the idea of publishing a Monograph on one of the species, and for the purpose *Lysandra coridon* Poda was chosen as giving most scope. As soon as he had accumulated sufficient material, he handed it over to Mr H. A. Leeds who, after some 20 years patient work and examination of other collections, arranged and classified it. Finally in 1938 *The Monograph on the Chalk Hill Blue*, by Bright and Leeds, was published privately, but the cost was so considerable that a popular price could not be arranged, much to Mr Bright's disappointment. This work, which is a marvel of detail and indexing, is in the Society Library. It contains several beautiful coloured plates and many plain ones containing several hundred figures, all of which are accurately described and termed by Mr Leeds. In Mr Bright's will, he left his large and comprehensive collection of three species of the *Lycaenidae*, viz. *Lysandra coridon* Poda, *L. bellargus* Rott. and *Polyommatus icarus* Rott., to the South London Entomological and Natural History Society, where it is now maintained as the "Bright Bequest."

It may be of interest to draw attention to certain of the outstanding forms in the Collection in view of the fact that, although it is accessible to the Town members of the Society, the same facilities are not so readily available to the Country members.

Lysandra coridon Poda.

Specially to be noticed is a beautiful female (ab. *ultra-radiata* B. & L.) with broad black streaks on the forewings, the ground colour of all the wings being cream. This insect was caught by Mr Bright himself in Sussex, to his great delight, in August 1938. There are many other somewhat similar forms. An upperside aberration of var. *syngrapha* Keff., taken on the Chiltern Hills, is also of interest as it appears to be the only known melanic upperside type that has been recorded. There is also a very remarkable and unique female (ab. *atrescens-ultra-albocrenata-fowleri* B. & L.) of black and white colouring only. There are also numerous examples of ab. *caeca* Courv. and ab. *radiata* Courv., on cream grounds, which are very rare. There are two males and two females of the supposed hybrid between *Lysandra coridon* and *L. bellargus*—ab. *polonus* Zeller. The various and numerous forms of mixed and bi-lateral gynandromorphs are very interesting as are the forms of ab. *inequalis* Tutt (female forms in which the wings contain areas of blue colouration not of the male tint, but that of the var. *syngrapha*). One particular example has the wings on one side entirely blue, whilst the other side is brown, and another has all four wings of blue colouration, resembling the var. *syngrapha*. The examples of ab. *cinnameus* B. & L., a male form of very pale blue colour with a cinnamon flush, are very striking and beautiful; the females of this form are of a fawn colour, somewhat similar to the ab. *khaki* B. & L., but decidedly distinct. There are also many interesting forms of the ab. *roystonensis* Pickett, in which there is inequality in the size of the wings, and there are areas of blue colouration accompanied with androconia and hair scales. The numerous examples of rare and beautiful forms must be seen to be appreciated.

Lysandra bellargus Rott.

This species varies in very much the same direction as does the preceding species, and there are many and beautiful examples of *radiata* Gasch., *ultraradiata* and *ultra-disco-radiata* and *caeca* (a form devoid of spots on the underside—except the discoidals). Many are on cream white grounds, which add to their attractiveness. One particular example of *ultra-disco-radiata* figured in Frohawk's and South's Butterflies is very beautiful, and must be seen to be fully appreciated, as no painting or drawing can successfully portray it. Another great rarity is a completely blue female, with marginal red spots resembling the Continental var. known as *coelestis* Obth. This was caught by the well-known collector, W. Austen, at Folkestone, and I cannot trace that a similar form has ever been recorded from Britain. There is a short series with male and female examples, of the very pale forms taken by the

Sabines in Queendown Warren, Kent, in 1886-7, and which for many years past have been assumed to be hybrids between *Polyommatus icarus* and *Lysandra bellargus*. The writer also has a series, and it may be of interest to quote the explanatory label below the series, indited by E. Sabine in his own handwriting. This is as follows:—

Hybrids between *L. Alexis* and *Adonis*.

“All taken by self and sons at Queendown Warren, Rainham, Kent, in the springs and autumns of 1886 and 7. See labels and *Entomologist*. See also Mr South's remarks, *Ento.*, Apl. 87. N.B.—It has been impossible to trace these forms further, the grass having been cut the following season, and cattle turned in to graze, and the Warren ruined as a collecting ground.”

The labels pinned beneath each insect carry the initials E. S., H. W. S., and L. A. E. S. At the time these forms were a source of controversy between J. W. Tutt and R. South, the first named stating that they were merely colour forms, similar examples of which he had taken in other localities, whilst Mr South maintained that they were hybrids. Dr E. A. Cockayne in an article in the *Entomologist's Record* stated “that in his opinion the insects were undoubtedly *L. bellargus* with which species the genitalia agreed. Both the upper and lower layers of scales are deficient in pigment and are curled and rolled to a varied degree and some androconia also. The evidence that the condition was due to disease was inconclusive.” In a recent letter to the writer he is of opinion that the condition is much more likely to be genetic. He considers that there are far too many of the form to be hybrids. The writer is under the impression that similar forms have, in recent years, been caught by L. A. E. Sabine in other localities.

There are many interesting forms of ab. *inequalis* and examples of mixed and bi-lateral gynandromorphs and a fine series of the partially blue form ab. *ceronus* Esp. (The blue form of female ab. *coelestis* is figured in Hübner as *ceronus*).

The series generally is little, if any, inferior in extreme and beautiful forms to that of the preceding species, *L. coridon*.

Polyommatus icarus Rott.

There is a remarkable range of variation in this species, and it contains examples of most of the forms drawn attention to in the case of the two preceding species. An outstanding example is the male underside figured in South's and Frohawk's *Butterflies* which, with its conspicuous red marginal spots, is unusually beautiful and there are very many examples that must be seen to be properly appreciated. The Society is, indeed, fortunate in possessing such a large, comprehensive, and unrivalled collection of the three species of British *Lycaenidae*, so valuable for biological and reference purposes.

The portrait of Mr Bright in his Mayoral robes has been reproduced by Mr P. Siviter-Smith, F.R.E.S.



F. W. FROHAWK, F.R.E.S.

F. W. FROHAWK (1861-1947).

Natural Science in Britain has always been served by men and women who have combined high artistic powers with a deep knowledge and love of our native flora and fauna. By creating true Works of Art in which beauty and accuracy are brought together they have delighted and instructed their own and later generations. Of this illustrious band Frederick William Frohawk was undoubtedly one. We were proud to number him among our members and to see his well-known and distinguished figure at our Meetings and particularly at our Annual Exhibitions which he attended to the last.

For several years infirmity had prevented him from working with pencil and brush. Many of his masterpieces were destroyed by enemy action, but reproductions of them, imperfect although they necessarily are, will serve as example to succeeding generations of artists. Happily, these are not lacking in this country and are, indeed, to be found in our membership.

Entomologists will for many decades be indebted to him for three valuable books on British Butterflies. Few have not consulted the two large volumes published in 1924 under the title *Natural History of British Butterflies*. This fine work with splendid coloured plates has taken its place among the great classic works on the subject. In 1934 appeared *The Complete Book of British Butterflies*, a book on more popular lines in which he used the names that had just been approved by the Royal Entomological Society of London. His last work was published in 1938. *The Varieties of British Butterflies* has 48 colour plates which are of great value to the many students of the variation of our native butterflies.

Frohawk was a fellow of the Royal Entomological Society of London, a member of the British Ornithologists' Union, and a member of our own Society. In 1943 he was made one of our Honorary Members.

His services to the Nation were recognised in 1932 by the award of a Civil List Pension.

He was twice married, first, in 1895, to Margaret Annie, daughter of Alexander Grant. They had two daughters. After her death he married, secondly, in 1911, Mabel Jane, daughter of A. Hart-Bowman, by whom he had one daughter.

T. R. E.

**THE SOUTH-EASTERN UNION OF SCIENTIFIC SOCIETIES'
JUBILEE CONGRESS AT TUNBRIDGE WELLS,**

JULY 9TH TO 13TH, 1946.

This Congress was notable for the exceptionally fine and hot weather which prevailed and the beautiful countryside in which it assembled. The attendance was excellent, and the Congress may be regarded as a great success. At the kind invitation of our President I was privileged to attend as a delegate of our Society and was able to be present at some of the meetings.

The proceedings commenced on Tuesday, 9th July, with the attendance of members at the Assembly Room where, after registration, it was possible to inspect a number of nature photographs and to purchase various publications. Among the latter was a book compiled by Dr J. C. M. Given, M.B.E., M.D., F.G.S., entitled *Tunbridge Wells, Past and Present*, which was specially written for the Congress and contains a number of articles dealing with the Town and District, its climate, geology, flora, fauna and other items of interest. This book has been added to our library and may be useful to some of our members. After talking with some of the members I walked to the Municipal Museum to inspect the exhibition of wild flowers which I found in course of preparation. The specimens included several interesting species and was dominated by a good example of the Giant Broomrape, *Orobanche major* L. The day was intensely hot and the perambulation of the town during the afternoon did not attract me. The alternative long excursion to Pevensey was not easy, as those attending had to find their own transport and petrol is somewhat precious.

On Wednesday, the 11th, all the places in the conveyance for the botanical excursion had been booked prior to my application so I entered my name for the Archaeological Section. In the morning I attended the lectures on "Wealden Ironworking, its sites and products" and on "Roman roads in the Weald," which were both illustrated with lantern slides and proved most interesting. The excursion in the afternoon started punctually at 2.15 p.m. and gave comfortable time for the inspection of a considerable length of the old Roman road which had been cleared of its superincumbent earth and grass and was in a fine state of preservation. The continuation of the road in a straight line towards Ashdown Forest was clearly visible. A drive to Crowborough, the highest point in the Sussex Weald, followed and, after tea, the party visited various parts of Ashdown Forest and was shown the course which the Roman road is said to have taken prior to its direct route from Ashdown Forest to Lewes. On the Forest the road is said to have taken a right-angled turn, which is unusual. Unfortunately, during the recent war the military have destroyed large areas of the surface of

the forest and little evidence of the old Roman road is now visible, but our leader, I. D. Margery, F.S.A., was well acquainted with the Forest prior to its destruction and was able to point out the course of the road.

On Thursday, July 11th, alternative excursions were offered to Darwin's house at Down and for a study of the local geology. The former was the more popular but I chose the latter and therefore attended the morning lectures which had reference thereto. Dr J. C. M. Given, F.G.S., read a paper on "Fifty Years of Wealden Geology," which formed a most valuable introduction, and R. Casey, F.G.S., followed with an interesting extempore lecture on "Aeolian or Marine? The Problem of the Folkestone Beds." He gave his own views upon the subject in a convincing way and a good discussion followed. The afternoon excursion started about an hour late. A visit was made to the Brickyard at High Brooms, where the workings have exposed a fine section of the pale yellow Lower Tunbridge Wells Sand resting on the dark grey shaley Wadhurst Clay. On a piece of the harder rock there was a fine example of ripple marking. Re-joining the conveyance, the party drove to Tunbridge Wells Common, the leader pointing out the outcrops of the Upper Tunbridge Wells Sand and the Grinstead Clay which separates the upper from the lower beds. On the Common the party inspected some of the masses of hard rock which occur in the upper horizon of the Lower Tunbridge Wells Sand and which form a notable feature of the district. A drive then took us to the High Rocks, where some time was spent in inspecting the rocks from below and above. These are generally regarded as the finest examples of the formation but other good examples occur at Eridge Rocks, Harrison's Rocks and other parts of Sussex. We visited Harrison's Rocks at our next stop, undertaking a considerable walk and a somewhat steep climb, and our leader pointed out to us how the strike-faults of the area had led to the beautiful scenery and the position of the outcrops of the Ashdown Sands and other strata. Tea was served at the Eridge Station Inn about six o'clock and was welcome for the afternoon was very hot and strenuous, though most enjoyable.

Full programmes were provided for Friday and Saturday, but I did not take part in them. Happily, the weather remained very fine and hot and the storms of Saturday did not come to Tunbridge Wells.

B. W. ADKIN.

ABSTRACT OF PROCEEDINGS.

INDOOR MEETINGS.

13th FEBRUARY 1946.

The PRESIDENT in the Chair.

It was announced that the following presentations to the Society's Collections and Library had been made:—By Mr H. B. Lawson, on behalf of his brother-in-law, Col. Thorne Thorne, a collection of butterflies made in tropical Africa; by Dr Conder and Mr H. G. Tunstall, a copy of *London's Natural History* by R. S. R. Fitter; by Prof. G. D. Hale Carpenter, a separate of his paper, "Bionomic Notes on a Colony of *Zygaena filipendulae* L."; by Mr M. Niblett, two separates of the papers by him.

EXHIBITS.

Mr W. H. SPREADBURY—Mounted specimen of the Long-Eared Bat, *Plecotus auritus* L.

Mr J. A. STEPHENS—The following rare beetles taken in the Chatham area in 1945:—*Hister merdarius* Hoff. on growing celery near a compost heap, *Prionocyphon serricornis* Müll on a decaying oak bough, *Bruchus luteicornis* Ill. on Wild Parsnip.

Mr T. R. EAGLES—Spray of male catkins of the evergreen shrub *Garrya elliptica* Dougl.

Mr J. FINCHAM TURNER read a paper, illustrated by lantern slides, on "British Bats" (see *Trans.*).

27th FEBRUARY 1946.

The PRESIDENT in the Chair.

Messrs A. F. E. Friedlein, F.R.E.S.; T. D. Goddard, F.R.E.S.; B. O. C. Gardiner; D. G. Hurter; G. Talbot, F.R.E.S., and C. Mellows were declared elected Members.

Mr T. G. HOWARTH exhibited a number of preserved larvae of *Herse convolvuli* L. and two living pupae of *Papilio bianor* Cr. sub-species *dehaani* Feld. from Hamhun, Northern Korea, and read the following note:

"At the re-union dinner of this Society last month I intended to show some larvae of *Herse convolvuli* L. which were taken by myself at Chemulpho, Central Korea, and preserved by the only method that was available at the time, i.e., stuffing. But, unfortunately, they were mislaid. The only implements at my disposal were a darning needle made from a corned-beef can opener and some cotton-wool stolen from the Japanese Medical Inspection Room. I included these last few remarks when I said a few words about my P.O.W. experiences at the above dinner.

" The larvae were found feeding on Morning Glory (*Ipomoea*), a species of cultivated convolvulus, during the summer months of 1943-1944. All the young larvae that were found were of the plain apple-green form, in fact they resembled *Smerinthus ocellatus* L. with their covering of small white points. Some of these (about 50%) changed to the dark brown form in their third instar. Some, however, remained green until they pupated. Amongst the dark brown forms was an intermediate form with a dark green ground colour with the usual dark brown and black markings superimposed. This form was much rarer and the three examples shown to-night represent just under 10% of the total number seen or taken of this species.

" In South's *Moths of the British Isles*, Ser. I, p. 29, he states: 'In its more usual form the caterpillar, when full grown, is bright apple green, narrowly streaked with black; oblique stripes on the sides yellowish; horn reddish; tip black. Head green with black stripes.' Later he goes on to say: 'Sometimes the general colour is blackish brown with ochreous bands and streaks.' He figures the dark brown form of the larva on Plate 9, fig. 2. Buckler in his *Larvae of British Butterflies and Moths*, Vol. 2 (Sphinges), Pt. 1, figures the same larva three times on Plate 21, figs. 2, 2a, 2b, also another on Plate 22, fig. 1 (? the same larva), all of the dark form again.

" It seems strange that neither South nor Buckler made any attempt to figure the form which to one of them seemed the more usual."

Mr C. N. HAWKINS described his experiences in 1945 when rearing larvae of *H. convolvuli* L. from eggs laid by a female taken by Dr K. G. Blair at Freshwater, Isle of Wight.

Mr P. M. MILES read a paper, illustrated by lantern slides, on "The Collembola" (see *Trans.*).

13th MARCH 1946.

The PRESIDENT in the Chair.

It was announced that the Society's Collections and Library were again accessible and that the Library would re-open on 10th April.

EXHIBITS.

The PRESIDENT, on behalf of Commander G. W. HARPER, R.N.—*Cleora repandata* L. ab. *conversaria* Hb. and dark forms of *Colotois pennaria* L., *Erannis leucophaearia* Schiff. and *Phigalia pedaria* Fb. taken recently in West Sussex.

Mr A. A. W. BUCKSTONE—*Malacosoma castrensis* L. ♀: One of several pale straw-coloured specimens without cross lines or markings of any description; bred from wild larva, Wakering, 1914. *Achlya flavicornis* L.: Varied series from Wimbledon, Epsom, Oxshott, Peaslake, Merthyr Tydfil, and Rannoch, the most noteworthy of these being a specimen with brown orbicular taken at Oxshott, February 1945.

Dr G. V. BULL—An exceptionally large example of *Oporinia christyi* Prout taken at light at Sandhurst, Kent, 1st November 1945, and two large Ichneumons, *Ophion luteus* L., taken February 1946.

Mr R. J. BURTON—A halved gynandromorph of *Celastrina argiolus* L. from New Milton, Hants.

Mr F. J. COULSON—Two specimens of *Apion lemoroi* Bris., a coleopteron new to the British List, taken at Effingham, Surrey, by Dr A. M. Easton, March 1945. It frequents *Polygonum aviculare* L.

Mr T. R. EAGLES—Sprays of male catkins of the deciduous conifer *Taxodium distichum* Rich.

Messrs W. H. SPREADBURY and W. J. FINNIGAN gave a talk on "Bird Photography without a Hide" (see *Trans.*). This was copiously illustrated by lantern slides. A discussion followed.

27th MARCH 1946.

The PRESIDENT in the Chair.

The recent death of Mr A. W. Dennis was announced.

Two separates had been received from Mr J. Sneyd Taylor:—(1) "Notes on the Birds of Van Rynevelde's Irrigation Lake, Graaf Reinet." and (2) "Notes on the Olive Beetle, *Agopistes sexvittatus* Bryant." There had been purchased for the Library the illustrated edition of Vol. 6 of Fowler's *Coleoptera of the British Isles*.

Messrs B. P. Moore, B.Sc., C. J. Williams, and J. Woolliscroft were declared elected members.

EXHIBITS.

The BARON DE WORMS—(1) Two stems of *Viburnum lantana* L. containing living larvae of *Aegeria andrenaeformis* Lasp. from the Winchester area. One stem showed the cap *in situ*: the other was without the cap. (2) Two stems of sallow containing feeding larvae of *Aegeria flaviventris* Staud. from the Woking, Surrey, area.

Mr B. O. C. GARDINER—A halved gynandromorph of *Celastrina argiolus* L. from Dover, Kent.

Mr W. J. FINNIGAN—A flowering spray of *Helleborus foetidus* L. from Surrey.

Dr HAROLD KING, F.R.S., read a paper, illustrated by lantern slides, on "Sex Attractant Principles of Moths" (see *Trans.*). A discussion followed in which several members joined. Dr H. E. Hinton and Dr O. W. Richards dealt with sex attraction in coleoptera and diptera respectively.

10th APRIL 1946.

The PRESIDENT in the Chair.

It was announced that Major H. S. Fremlin, M.R.C.S., L.R.C.P., F.R.E.S., had presented a large number of parts of the *Proceedings and Transactions of the Royal Entomological Society of London*.

Mr J. K. C. Kemp and Capt. L. Parmenter, F.R.E.S., were declared elected members.

The PRESIDENT gave a brief description of a recent visit to Aviemore together with our member, Mr Dickson, of Micheldever.

“Very warm weather had been experienced for three days before arriving, and *Brachionycha nubeculosa* (Esper) was well out. Six were found by searching on the first day, and the males came to light in large numbers that night. Searching the birches on subsequent days revealed no more *B. nubeculosa*. This suggested that the emergence was over. The moths rest low down after emerging but sit higher on the trees after having been in flight.

The willows round the hotel were in full bloom but practically over by 2nd April. They were out before the moths, which were only just emerging, the great majority being males.

One visit was paid to the haunts of *Amathes alpicola* (Zett.) in perfect weather. Two full-grown larvae were found under the reindeer-moss, after a short search, together with one *Psodos coracina* (Esp.). On the way up, cocoons of *Apatele euphorbiae* (Schiff.) var. *myricae* Guen. were found on the rocks, whilst *Brephos parthenias* (L.) were flying in numbers on the lower ground.

On a visit to Struan on 1st April, Mr Dickson found *Poecilopsis lapponaria* Boisd. well out and apparently spreading south towards Struan.

To hit off such weather for a visit at this time of year can only happen about once in a lifetime.”

He also said that he had just seen an enormous female *Nymphalis antiopa* (L.) captured in a wood near Winchester on 31st March.

Col. CARDEW reported *Polygonia c-album* L. as being attracted to blackthorn blossom at Ashted, Surrey.

Dr G. V. BULL reported having recently seen *Celastrina argiolus* L.

BARON DE WORMS had seen *Euchloë cardamines* L., *Pieris napi* L., and *Pararge aegeria* L.

EXHIBITS.

Mr J. O. T. HOWARD—A small collection of shells of the genus *Cypraea*, or cowries, from Ceylon and other islands in the Indian Ocean.

Dr G. V. BULL—A selection of Hymenopterous parasites from Lepidopterous larvae, including *Comedo larvarum* L. from *Apatele leporina* L., *Meteorus melanostictus* Marsh. from *Thera obeliscata* Hb., *Macrocentrus linearis* Nees (= *abdominalis* F.) from *Notarcha ruralis* Scop., *Apanteles fraternus* Reinh. from *Crocota ochrearia* Rossi, and *Pteromalus puparum* L. from pupae of *Pieris brassicae* L. He also exhibited *Sirex gigas* L. (Hym. Siricidae) and the Dragonflies *Pyrhosoma nymphula* Sulz., *Coenagrion puellum* van der Lind., and *Sympetrum striolatum* Charp.

Mr F. D. GOODLIFFE—Imagines of the sawfly *Cimbex femorata* L. from Long Sutton, Hants., a pair of Palmate Newts (*Molge palmata* Dum. & Bibr.), and living specimens of the water beetle *Agabus affinis* Payk.

Mr T. R. EAGLES—The aphid *Pteroclorus salignus* Gmel. from a willow tree at Enfield, Middlesex. They were congregated in immense numbers on the tree, seeming to prefer twigs of the thickness of a lead pencil. Their exudation fell in a noticeable manner on anyone standing under the tree and plants growing beneath were covered with it. Large numbers of flies of the genus *Lucilia* (green bottle flies) and many Syrphid flies were in attendance. If the aphids were alarmed by the approach of a wasp or if a hand were put near them they all waved their legs in the air. He also exhibited the grasses *Dactylis glomerata* L. and *Lolium perenne* L. showing proliferation; and seeds of the Tree of Heaven (*Ailanthus glandulosa* Desf.).

Mr W. H. SPREADBURY—A hymenopterous parasite of *Tethea* or Schiff.

24th APRIL 1946.

Mr L. T. FORD, Vice-President, in the Chair.

It was announced that the "Bright" collection of British "blue" butterflies had been brought from the Hope Museum at Oxford, where it had been placed for safety during the war.

The SECRETARY, on behalf of Drs E. Scott and G. V. Bull, read the following list of dates when the insects named had been first seen in 1946:—*Pieris brassicae* L., 25th March; *Lycaena phlaeas* L., 3rd April; *Pieris rapae* L., 4th April; *Euchloë cardamines* L., 9th April; *Lycia hirtaria* Clerck, 28th March; *Macroglossum stellatarum* L., 30th March; *Cosymbia pendularia* Clerck, 12th April; *Pyrgus malvae* L., 20th April; *Coenotephria derivata* Schiff., 20th April.

Mr E. W. CLASSEY reported that *Callophrys rubi* L. was seen on the wing in Surrey on 19th April, that *Nymphalis antiopa* L. had recently been taken at Welwyn, Herts., and that he had seen *Pontia daplidice* L. in Middlesex on 21st April.

EXHIBITS.

The CHAIRMAN—Cases containing living larvae of *Narycia marginipunctella* Steph.

Mr A. BLISS—*Sphinx ligustri* L. with the usual mauve markings replaced by creamy-buff. The insect was typical of a series reared from Cornish ova.

The BARON DE WORMS—(1) Full fed larvae of *Melitaea aurinia* Rott. obtained in Hampshire, 13th April. (2) Two small larvae of *Limenitis camilla* L. found in Suffolk, 19th April 1946. (3) Full fed larvae and cocoons of *Dyscia fagaria* Thunb. obtained after dusk in the New Forest, Hants., 13th April 1946.

Lt.-Col. J. H. B. LOWE, R.E., read a paper, illustrated by the lantern, on "Collecting Experiences in India" (see *Trans.*).

8th MAY 1946.

The PRESIDENT in the Chair.

EXHIBITS.

Mr W. H. SPREADBURY—Ergot of Rye, *Claviceps purpurea* Tul., on the grass *Deschampsia caespitosa* L. This was from material exhibited on 12th December last and now showed the new horn-shaped bodies or sclerotia. He also exhibited larvae of *Hygrochroa syringaria* L. and ova of *Pieris napi* L. and of *Euchloë cardamines* L. from Surrey.

Mr L. T. FORD—Pupae of *Aporia crataegi* L. of foreign origin.

Mr W. H. A. HARRIS—Series of moths recently collected and read the following note.

“ This year I found the common spring noctuids extremely abundant at sallow blooms and I am exhibiting a few of these, which show a wide range of variation, all obtained from half-a-dozen tall sallow bushes situated on the northern outskirts of a small oak wood on the Hants-Surrey border.

“ Firstly, the method of capture may be of some interest. I set up the Tilley lamp at dusk, with a six-foot square sheet on the ground, just near the bushes. There were a good number of moths present but few were attracted to the sheet, so I shook the bushes vigorously and the moths fell off in hundreds, a few on to the sheet but the majority into the undergrowth. Whilst I was inspecting those on the sheet for about ten minutes, those in the undergrowth began to stir and at once came to the lamp. They were so numerous that there was a wild blur for a time until they started to settle down. In these few nights at the end of March I must have had a choice of a good many thousands.

“ The *Orthosia munda* Schiff. are a picked series, about 200, which I brought away. I intended to classify them into some sort of order according to Tutt, who quotes nine main varieties, but as almost every one is different I have been unable to do so at present.

“ The *Orthosia stabilis* Schiff. include a few of a pronounced banded form which I had not taken before and one has the orbicular and reniform stigmata joined into a heart-shaped marking.

“ One *Apocheima hispidaria* Schiff. is very large and pale. I have put in a normal suburban specimen for comparison.

“ I also collected a fair number of *Zygaena trifolii* Esper larvae. Amongst these were 12 showing various deformities. One marked example of spiral segmentation was given to Mr Classey for expert description. Nine have pupated and two are now exhibited. *Zygaena trifolii* is not in Dr Cockayne's list as having shown this deformity before.”

Mr E. E. SYMS—The tortoise beetle *Cassida vittata* de Vill. and ova.

Mr T. R. EAGLES—(1) A dark form of *Dysstroma truncata* Hufn. from Enfield, Middlesex. All the moths of the brood were similar. (2) Rose Chafer Beetles, *Cetonia aurata* L. These were reported to be doing much damage in a garden at Totteridge Green, London, N.20.

Mr H. LAST—Three attractively coloured ground beetles and communicated the following note:—

"*Lebia chlorocephala* Hoff.: I took from grass roots on 27th April at Banstead. On the sheet I thought at first that it was the common *Sermyla halensis* L. but its flattened appearance and speed soon showed me I was mistaken. There are three other species of the genus all rare or very rare—this species is said to be very local. Fowler quotes a number of localities and several of these are in Surrey. *Panagaeus bipustulatus* F.: I took in 1935 at Banstead. It is rare and found in chalky localities. The other species of the genus, *Panagaeus crux-major* L. I took by the side of River Ouse, Brampton, Hunts., in May 1945; this is also local and found in damp places."

Several members gave accounts of their collecting experiences in 1946. Mr E. W. Classey described the abundance of larvae of *Aegeria myopaeformis* Bkh. in an orchard at Feltham, Middlesex. They were feeding under the bark at the end of broken boughs.

22nd MAY 1946.

The PRESIDENT in the Chair.

Mr B. M. Evans was declared elected a member.

EXHIBITS.

Dr A. S. CORBET—The Agrotid moth *Xanthopastis timais* Cr. The insect was among an assortment of common insects taken in the London area and brought to Dr Corbet for naming. It is a native of America—South U.S.A. to Mexico, West Indies, and South to Argentina. Its larva is believed to feed on Amaryllidaceae.

Mr S. R. BOWDEN—(1) A buff female of *Pieris napi* L. obtained in the second filial generation from a crossing of ab. *hibernica* Schmidt (= *citronaea* Frhk.) with a S. Essex insect. (2) *Papilio machaon* L. (continental form) taken 9th May 1946 at Hill Head, Fareham, Hants.

Dr G. V. BULL—(1) The procryptic larva of *Catocala promissa* Schiff. taken on lichen in the New Forest, Hants. (2) A larva of *Nycterosea obstipata* F. from the Isle of Wight. (3) The oak gall caused by the Cynipid *Andricus fecundator* Hart. and its alternate sexual generation f. *pilosus* Adler.

Mr T. G. HOWARTH—The cocoon of *Nola cucullatella* L. on a twig of hawthorn, a fair example of cryptic coloration. The larva was found at Benfleet, Essex, on 12th May and it began to spin up on the 19th.

BARON DE WORMS described his recent collecting experiences in Scotland.

Dr H. B. WILLIAMS read, on behalf of Mr J. Antony Thompson, a paper, "Some Preliminary Observations on *Pieris napi*" (see *Trans.*). Dr Williams answered questions, and a general discussion followed. Mr Hugh Newman described the difficulties encountered in a series of breeding experiments designed to elucidate the ratio of green to brown pupae of *P. napi*. Dr Williams warned experimenters of the grave danger of genetical work being spoilt by the introduction of ova or young larvae

with the food plant. The white and the pale yellow albino forms of *napi* were, he was convinced, both simple recessive, the factor being the same in each case. The biology of the Spring and Summer broods was discussed.

12th JUNE 1946.

The PRESIDENT in the Chair.

The meeting was held at the Apartments of the Linnean Society of London, Burlington House, London, W.1.

Mr R. M. Mere was declared elected a member.

The President announced the gift of a large collection of blown larvae of British Macro- and Micro-lepidoptera by Mr R. L. E. Ford and Mr E. W. Classey, and of 24 blown larvae by Mr H. E. Hammond. Votes of thanks from the Chair were carried by acclamation.

EXHIBITS.

Mr S. N. A. JACOBS—A collection of insects of economic importance taken in recent years and now presented to the Society, chiefly Coleoptera, but also Hemiptera and Dermaptera.

Mr E. W. CLASSEY—Larvae of *Eilema griseola* Hb. from Wood Walton Fen, Hunts. They were found, after dark, feeding on lichen growing on the trunks of Birch trees and also on lichen on sugared posts. Larvae of *Trichiura crataegi* L. from Monk's Wood, Hunts., to show the great variability of the larva of this species.

Dr G. V. BULL—Two imagines of *Papilio machaon* L. (French-race *gorgonus* Fruh.), bred from larvae found in cottage gardens at Sandhurst, Kent, in 1945.

Sir LEONARD WAKELY—Newly hatched larvae of *Stauropus fagi* L. from Berkhamstead, Herts.

Mr T. R. EAGLES—(1) Ichneumonid cocoons beaten from oak at Ashstead, Surrey. These (subsequently identified as *Spudastica krieckbaumeri* Bridg.) make small leaps when disturbed (see *Trans.*, 1934-35, pp. 88-9). (2) Flowers of *Campanula patula* L.

BARON DE WORMS—(1) Larvae of *Nudaria mundana* L. from Swanage, Dorset, and (2) a newly emerged female imago of *Amathes alpicola* Zett. (= *hyperborea* Zett.) from Aviemore, Inverness.

Mr E. W. CLASSEY and Mr R. W. PARFITT reported having visited Wood Walton Fen, Hunts, 1st to 5th June. The weather was very poor and collecting at sugar and light produced little in point of numbers. Four *Hydrillula palustris* Hb. were taken, one on 1st June and three on 2nd June, all males. They were taken between 00.15 and 01.25 B.S.T.

Mr J. O. T. HOWARD reported a visit to the same spot, 3rd to 10th June. Neither sugar nor light were very attractive owing to very bad weather. On the night of 7th June weather improved and five *H. palustris* were taken—four at light and one on a reed head. Two more were taken on 9th June, one at light and the other flying strongly. All seven were males and all appeared between 23.30 and 02.05 B.S.T.

Mr R. F. HAYNES communicated the following report of a visit to the Chiddingfold district of Surrey.

"The weather over Whitsun was very showery and the sun shone scarcely at all. On Whitsunday I worked Durfold Woods and Sidney Woods. Large areas in Sidney Woods are now devoid of trees, and larvae in the locality are now considerably less numerous than before the war.

"Imagines seen on the wing:—*Argynnis selene* Schiff.—fairly plentiful; *Leptidea sinapis* L.—a single specimen; *Eulype hastata* L.—a single example; *Cepphis advenaria* Hb.—a single example of this somewhat local species I took in Durfold Woods. Larva beating both in Durfold and Sidney Woods produced the following:—*Orthosia miniosa* F.—fairly common; *Brachionycha sphinx* Hufn.—one only from an oak near Witley Station; *Polyphlocia ridens* F.—fairly common; *Lymantria monacha* L.—not common, a few from Sidney Woods; *Poecillocampa populi* L.—two larvae from oak; *Trichiura crataegi* L.—one only from willow; *Thecla betulae* L.—seemed very scarce: I beat only three larvae from the sloes. On the whole larvae of uncommon species seemed scarcer than usual for this district."

Dr H. B. D. KETTLEWELL reported that *Colias hyale* L. had recently been seen near Durfold, Surrey.

The meeting was held under difficult conditions owing to a failure of the electric light and it was unfortunately impossible for Mr E. J. Bedford to give his promised talk on British Wild Flowers or show his hand-coloured slides. The President expressed his regrets to Mr Bedford and said that members looked forward to the pleasure at some later date.

There was no meeting on 26th June 1946, owing to the rooms not being available.

10th JULY 1946.

The PRESIDENT in the Chair.

At the Apartments of the Linnean Society of London, Burlington House, Piccadilly, London, W.1.

The death of Mrs M. Stanley-Smith was announced.

EXHIBITS.

Dr H. B. WILLIAMS—A selection of the varieties of *Angerona prunaria* L. to illustrate his paper.

BARON DE WORMS—(1) *Eriogaster lanestris* L., full-fed larvae from a nest found near Lewes, Sussex, on 15th June 1946. (2) *Cucullia chamomillae* Schiff., one full-fed and a half-grown larva found near Angmering on 6th July. (3) *Eupithecia pulchellata* Steph., larvae feeding in foxglove flowers found at the Field Meeting in Alice Holt Forest, Farnham, Surrey, 7th July 1946. (4) *Ennomos autumnaria* Wern., full-fed larvae ex ovis from a Folkestone, Kent, female.

Dr H. B. D. KETTLEWELL—Parasites of *Amathes alpicola* Zett. (= *hyperborea* Zett.) and read the following note: "It would appear that there must be some complex explanation for the appearance on alternate years only of the moth *A. alpicola* Zett. In the process of thousands of years it must be assumed that many times certain larvae have lapsed from the usual two-year life cycle to one of three years, due to abnormal weather conditions, etc. We should therefore expect, other things being equal, to have a certain number of *alpicola* imagines each year, and it is interesting to speculate that, by this isolation of one year's hatch from another, theoretically at least, two forms of a species could have arisen in the same locality, occurring in alternate years. This is not the case, however, and it appears to me that a possible explanation might be found in its parasites, with some alternative host being infected in those years when *alpicola* does not hatch. If we assume that this parasite has a marked preferential host in *alpicola* to, say, *Psodos coracina* Esper, which occurs in the same localities as *alpicola* but in alternate years to it, one would then have a state of affairs where any *alpicola* which attempted to get out of step with the usual procedure would be immediately parasitised in preference to larvae of *P. coracina*. It appears to me that some explanation of this sort must be necessary to account for the complete absence of *alpicola* imagines in odd years: I will be most grateful if any collector who has the opportunity next year of finding wild *coracina* larvae would keep all parasites bred from them and see if they are the same species as those found in *alpicola*."

Mr J. A. RILEY—*Brephos parthenias* L. var. *flava* Worsley-Wood from Wimbledon, Surrey.

Mr R. F. HAYNES—*Apamea characterica* Hb. (= *hepatica* Hb.) and *Chloroclysta siterata* Hufn. from Killarney.

Mr F. D. BUCK—Psocids infesting spaghetti.

Mr F. D. GOODLIFFE—A series of *Argynnis euphrosyne* L.

Mr H. R. LAST—Hymenoptera of the genus *Pteromalus* parasitic on the larvae of a species of leaf-cutter bee, *Megachile*, and communicated the following note by Dr Blair: "The cells are certainly those of a *Megachile*, and from the size are probably *M. ligniseca* Kirby, though without the bee I am afraid it is impossible to be sure of the species. You may find a dead bee in one or more of the cells and that would suffice. The only Chalcid parasite of *Megachile* that I know of is *Monodontomerus obsoletus* F., but yours is, so far as I can make out, one of the large genus *Pteromalus*, though I cannot determine the species. Unfortunately I cannot find an antenna among the lot (though even with one I should be in no better position). I think even with these unsatisfactory determinations it is worth putting the case on record . . . the association of *Pteromalus* with *Megachile* appears to be new, at least to my knowledge."

Mr Last also exhibited *Trigonogenius globulus* Sol. and read the following note: "*Trigonogenius globulus* Sol. These beetles were found in a sample of matté this week in the City. In Fowler and Donisthorpe

(Vol. VI, p. 147, 1913) it is recorded from granaries and corn mills in Oldham, Manchester, etc., also from Tottenham and Birmingham. Joy states that it is rare, but Mr Jacobs exhibited the beetle a year or so ago and Mr Henderson took it some 40 years ago. It is a native of Chili."

Mr T. R. EAGLES—Larvae of *Cepphis advenaria* Hb. from Surrey.

Mr E. J. BUNNETT—Dried specimens of the Earth Star fungi *Geaster byantii* Berk. from Sussex, *G. fornicatus* Huds. from Surrey, and *Astraeus hygrometricus* Pers. from Surrey.

Mr J. L. HENDERSON—*Brachypterolus vestitus* Kies., from his garden at Purley, Surrey (a new county record), and said: "This western Mediterranean species was first reported in this country from Cambridge in 1928, and still occurs there. In 1944 and 1945 it was recorded from Bedford, Herts., and Kent. It attacks the flower-heads of garden Antirrhinum in the same way as the common *B. pulicarius* L. does of *Linaria vulgaris* Mill. Apparently neither insect will touch the other genus of plant."

Miss W. M. A. BROOKE—Various species of British orchids, a flowering spray of *Lathyrus tuberosus* L. from Fyfield, Essex, and examples of phyllody of *Trifolium repens* L.

Mr J. O. T. HOWARD—The seven specimens of *Hydrillula palustris* Hb., Wood Walton Fen, 7th-9th June 1946, reported at the last meeting.

Colonel P. A. CARDEW—A short series of *Melitaea cinxia* L. taken in the I. of Wight between 17th and 30th May 1946, showing various minor aberrations.

Dr H. B. WILLIAMS read a paper on "The Varieties of the Orange Moth, *Angerona prunaria* L." (see *Trans.*).

24th JULY 1946.

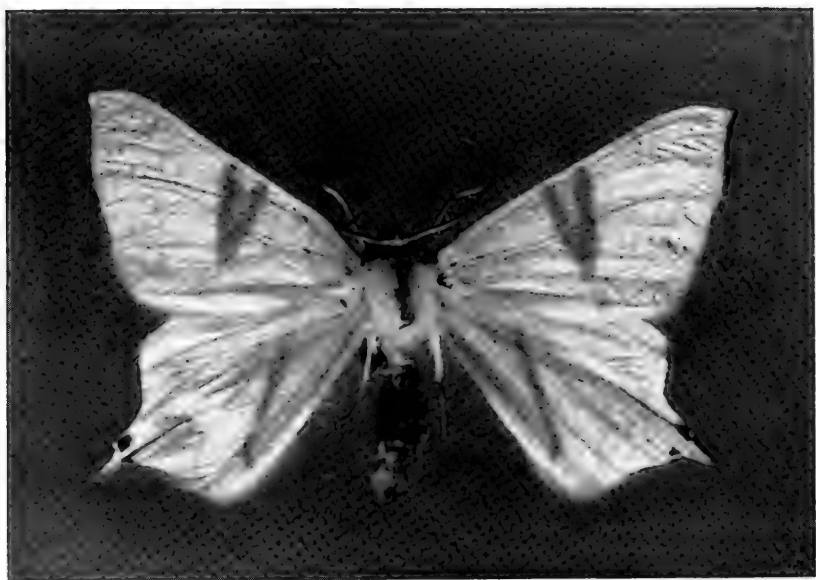
The PRESIDENT in the Chair.

Messrs C. F. Astbury, C. G. Roche, Wm. Wildridge, C. M. Burnell, R. A. Carter, W. E. Downes, D. S. Fletcher, and J. D. Bradley were declared elected members.

EXHIBITS.

The PRESIDENT, Captain R. A. Jackson, showed full-fed larvae of *Chiasmia clathrata* L. These were hatched on 27th June from eggs laid by a Hampshire female, and fed up on red clover. Out of five larvae which survived, all remained green until the final instar, when four became dark sienna brown, with the white markings usual to the green form of the larva. A violet form was exhibited at our meeting of 13th June 1940. It is remarkable that in both Buckler and South only a green form of larva is referred to.

BARON DE WORMS—A pupa of the Large Tortoiseshell Butterfly, *Nymphalis polychloros* L., from Suffolk. He said these pupae were to be found under the copings of walls and on farm buildings.



OURAPTERYX SAMBUCARIA L. A variety exhibited by Mr R. M. Mere,
14th August 1946.

Mr R. F. HAYNES—A short series of *Pieris napi* L. collected at Killarney, S.W. Ireland, Spring 1946, to illustrate variation in Irish forms.

Miss W. M. A. BROOKE—The following plants recently collected in Bedfordshire:—*Orchis pyramidalis* L., *Melampyrum cristatum* L. and *M. arvense* L.

Mr C. N. HAWKINS—A preserved larva of *Catocala promissa* Schiff. This larva had been exhibited alive by Dr G. V. Bull on 22nd May.

Mr T. R. EAGLES—Cocoons and imagines of the small Neuropteran *Conwentzia psociformis* Curt. from oak trees at Enfield, Middlesex.

Mr A. BLISS reported seeing in Sussex an abundance of *Macroglossum stellatarum* L., also *Colias croceus* Fourc. The larger Fritillaries were, in his experience, scarce this year and he had not seen *Apatura iris* L.

Col. F. A. LABOUCHERE said that in W. Sussex he had found *Argynnis paphia* L. to be common and he had seen *A. iris*.

Miss W. M. A. BROOKE read a paper on "Spring Flowers of Cape Peninsula." This was illustrated by lantern slides (see *Trans.*).

Mr F. D. BUCK read a paper on "Collecting Experiences in the Army" (see *Trans.*).

14th AUGUST 1946.

The PRESIDENT in the Chair.

The receipt of a grant of £125 from the Royal Society was announced. Messrs John Dunbar, F. L. Playford, D. S. Palmer, and Major A. E. Collier were declared elected members.

EXHIBITS.

The PRESIDENT—Young larvae of *Angerona prunaria* L. from ova laid by a ♀ from Hampshire.

Mr S. N. A. JACOBS—A series of the beetle *Trichius fasciatus* L. taken from flower heads at Aviemore, Inverness.

Mr J. O. T. HOWARD—(1) A specimen of *Precis almana* L. taken in Colombo, Ceylon, 15th July 1945, which bore marks suggesting an attack by a lizard, and (2) Reeds showing the mode of pupation of *Non-agria geminipuncta* Hatch. from Reculver Marshes near Herne Bay, Kent.

Mr W. J. FINNIGAN—A larva of *Macroglossum stellatarum* L. from Boxhill, Surrey.

Colonel P. A. CARDEW—Eight specimens of *Boarmia punctinalis* Scop. from Wimbledon Common showing local variation.

Mr B. O. C. GARDINER, on behalf of Mr E. A. Duffy—The Longicorn beetle *Superda carcharias* L. taken in Middlesex.

Mr R. M. MERE—A specimen of *Ourapteryx sambucaria* L. in which the cross lines of each forewing are united to form the letter V. It had been bred from a larva taken at Haslemere, Surrey, in September 1928. (See Plate IV.)

Mr F. D. BUCK—Series of *Cerylon fagi* Bris., *C. histeroideus* Fb., *C. primroseae* Donis. and *C. ferrugineum* Steph., and read notes on the differences between the species.

Dr H. B. D. KETTLEWELL—Series of varieties of *Arctia villica* L. and *A. caja* L., the former series including an all-black variety and also ab. *wardi*. He reported immense numbers of the larvae of *A. caja* in the Birmingham area.

Mr H. LAST—Larvae, pupae, and imagines of *Chrysomela tremulae*, Fb., taken on aspen at Esher Common, Surrey.

Mr T. R. EAGLES—Galls caused by *Aulacidea hieracii* Bouch. on the lower part of the stems of *Hieracium boreale* Fries. from Ash Vale and also the cockroach *Ectobius panzeri* Steph. and an Upper Cretaceous fossil (*Micraster* species), from the same locality.

Mr L. T. FORD reported having reared *Mompha stephensi* Staint. He was convinced that the larva fed and pupated in oak bark.

Mr WM. WILDRIDGE reported taking *Argynnis cydippe* L. and *A. aglaia* L. on the 4th and 5th of August in Herts.

Colonel P. A. CARDEW reported *Nymphalis polychloros* L. from the Isle of Wight.

Mr J. A. RILEY reported *Melanargia galathea* L. in abundance in South Devon, where also *Thymelicus lineola* Ochs. was now to be found.

Mr SYMS reported having attended the Annual Meeting of the British Association at which the Presidential address was delivered.

The SECRETARY read Mr B. W. Adkin's report of the conference of the South Eastern Union of Scientific Societies.

28th AUGUST 1946.

The PRESIDENT in the Chair.

Messrs C. M. Gummer; J. A. Walker, M.B., B.S.; E. W. Bowser, J.P.; A. Eckford, M.D. (Cantab.), M.R.C.S.; A. W. Letts, F.R.E.S.; and R. Fairclough were declared elected Members.

EXHIBITS.

Mr J. A. RILEY—*Volucella zonaria* Poda (Dipt., Syrphidae) taken on the previous day at Wimbledon Common, Surrey. He also showed for comparison *V. inanitis* L. and hornets, *Vespa crabro* L. (Hym., Vespidae), with which *V. zonaria* associates and of which it has been said to be a mimic. He communicated the following note:—

“ *Volucella zonaria* (Poda) in Great Britain.

The records of the occurrence of this species in Great Britain are brought together in a paper by Capt. Rivenhall Goffe in the *E.M.M.*, July 1945, page 159. He concludes that up to that date there were six authentic British specimens in collections. Subsequent to this Lt.-Col. Fraser records eight specimens seen at Bournemouth in August 1945, six of which were taken [*E.M.M.*, October 1945, page 237]. All these twelve were females.

Three further specimens are in the Brit. Mus. (Nat. Hist.) and have not previously been recorded. These are two females, one from Deal, in Kent, taken in August 1945, and one from Weymouth also taken in August 1945. The other is a male taken at Parkstone, Dorset, in September 1944. Further, it is reported in the *E.M.M.*, March 1946, pages 57, 58, that one female was taken near Rottingdean, Sussex, at the end of July 1945 and that the species has occurred regularly near Chatham and Hythe, Kent, since 1938.

Two other specimens are recorded in the *Transactions of the Suffolk Naturalists' Society* for 1945. These are, one male at Sutton in August 1945 by Miss Frohawk, and one female in September 1945 at Bristol by Mr Burton. Mr Haines has in his possession one female which he thinks he may have taken as a boy at Edenbridge, Kent.

These are the only records of the species in this country so far as I know. It appears to have established itself in Kent recently. It also now appears to be established on Wimbledon Common as one female was taken there on Sunday, 25th August, by Mr Riley-Irving and I took another there on the following Tuesday, also a female. Both specimens were in perfect condition and had obviously bred on the Common. It is interesting to note that the hornet, *Vespa crabro*, which some claim it mimics, and in the nest of which its larvae have been found, has increased in numbers recently on the Common."

Mr F. J. COULSON—About 100 species of Hemiptera-Heteroptera recently taken at Ashted, Surrey, in connection with the forthcoming list of the fauna and flora of the area.

Mr C. H. HARDS—Larvae of *Cucullia gnaphalii* Hb. taken near Lewes, Sussex, 21st August 1946.

Mr E. W. CLASSEY—A number of pupae of *Macroglossum stellatarum* L. from larvae collected in South London.

Mr T. R. EAGLES—The fungus *Boletus sanguineus* With. and a larva of *Apatete aceris* L., both from Enfield, Middlesex.

Several members made reports of their recent observations. In connection with these Capt. N. D. Riley referred to recent reports of *Nymphalis polychloros* L. It had been suggested to him that some of these insects might prove to be the closely allied *N. xanthomelas* Esp. The former has black legs and the latter buff.

Mr R. F. HAYNES then read his paper, "Some Notes on Observations of the Rhopalocera of Southern Italy (1944-1945)," illustrated by lantern slides (see *Trans.*).

11th SEPTEMBER 1946.

The PRESIDENT in the Chair.

EXHIBITS.

Mr E. W. CLASSEY—Living larvae of *Hydrillula palustris* Hb. and *Caradrina morpheus* Hufn. for comparison. In working debris for the former large numbers of the latter are encountered.

Mr T. R. EAGLES—Larvae of *Pseudoips bicolorana* Fuessl. and *Lophopteryx capucina* L. from Enfield, Middlesex; larvae of *Clostera curtula* L. from Ash Vale, Surrey; and the fungus *Boletus parasiticus* Bull. growing on *Scleroderma aurantium* Pers. from Epping Forest, Essex.

The BARON DE WORMS—Larvae of *Apatele aceris* L. and *Mimas tiliae* L. from London, *Pheosia gnoma* F. from Salisbury, Wilts., and *Noto-donta dromedarius* L. from Horsell, Surrey.

Mr E. B. PINNIGER—*Sympetrum fonscolombii* Selys: A male of this rare species from Enfield West taken by Mr C. O. Hammond, July 1946. *Gomphus vulgatissimus* L.: A pair of this local species from the New Forest, taken June 1946. *Coenagrion scitulum* Ramb.: Photographs of a pair of this species taken in S.E. Essex, July 1946. Not previously recorded from Great Britain.

Mr C. N. HAWKINS—(1) Lepidoptera:—*Cryphia perla* Fabr., a ♂ with the forewings heavily suffused with dark grey scaling, Ashtead, Surrey, 25.vii.1946; and a ♀ with the ground colour and bands of the forewings light and dark orange-buff respectively, Wimbledon, 2.viii.1946. *Hadena w-latinum* Borkh. (*genistae* Borkh.), 2 ♂ and 2 ♀, part of a long series bred in 1944 from ova found on a Sallow leaf at Ashtead on 19.vi.1943, and *Mesotype virgata* Rott., 4 ♂, 3 ♀, part of a series bred in April 1946 from eggs laid by a ♀ taken at Burnham-on-Sea, Somerset, on 19.iv.1945. Two specimens only emerged as a partial 2nd brood in 1945, one in October and one in December, indoors. (2) Coleoptera:—*Necrophorus vespilloides* Hbst. (*mortuorum* F.); *Bolitobius lunulatus* L., *B. trinotatus* Er. and *B. thoracicus* F. (*pygmaeus* F.); *Mycetodrepa alternans* Grav. and *Philonthus marginatus* Str., all from fungus at Ashtead on 7.ix.1946.

In the course of a discussion on the season it was reported that *Plebejus argus* L. had been abundant in North Wales and that the larvae of *Lithosia quadra* L. were plentiful in the New Forest, Hants.

Mr H. G. TUNSTALL reported having seen a ♂ *Celastrina argiolus* L. in flight at the corner of Fetter Lane and Fleet Street, which is within the boundary of the City of London.

Lt.-Colonel W. G. HAWLEY reported the occurrence of *Laphygma exigua* Hb. at light in his house on 1st September.

25th SEPTEMBER 1946.

The PRESIDENT in the Chair.

The President announced that the Curator had prepared a list showing in which of the Society's cabinets and in which drawer any particular species of Lepidoptera could be found.

EXHIBITS.

Mr F. D. BUCK—Three species of beetles, all taken under beech leaves on the edge of a pond in Epping Forest (15.ix.46). *Habrocerus capillaricornis* Gr., which requires setting immediately after killing owing

to its delicate structure. In life it is readily distinguishable from the other Tachyporines by its habit of running with its abdomen raised in the manner of *Astilbus canaliculatus* F. *Trechus* (*Epaphius*) *secalis* Payk., very similar to the Bembidions but can be very easily separated by the large terminal joints of the palpi. *Barypithes pellucidus* Boh., a rather local member of the genus.

Mr JACOBS—A series of *Pytho depressus* L. (Col. Pythidae), bred from larvae collected at Aviemore, Inverness.

Mr W. H. SPREADBURY—(1) Larvae of *Boarmia roboraria* Schiff., (2) Galls on bramble stems caused by *Diastrophus rubi* Bouché (Hym.), and (3) Galls on the stems of *Hieracium umbellatum* L. caused by *Aulacidea hieracii* Bouché (Hym.), all from Surrey.

Mr R. F. HAYNES—An almost fully-grown larva of *Habrosyne derasa* L. found during the daytime on a bramble shoot in Alderbury Woods near Salisbury, Wilts.

Mr T. R. EAGLES—A branch of the plant chimaera or graft hybrid *Crataegomespilus dardarii* Jouin. (*Mespilus germanica* L. \times *Crataegus monogyna* Jacq.).

Mr V. E. AUGUST—The Cypress Spurge (*Euphorbia cyparissias* L.) found growing on Epsom Downs, Surrey.

Mr S. C. S. BROWN—Set specimens, living insects, drawings, larval mines, and cones in illustration of the paper which he read entitled "*Caloptilia* Hübn., a genus of *Teneina*." A discussion followed, in the course of which it was explained that the larvae were able to fold over relatively large leaves by means of the contraction of the silken threads they spin (see *Trans.*).

9th OCTOBER 1946.

The PRESIDENT in the Chair.

Messrs T. R. E. Southwood, L. F. Ferguson, L.D.S., R.C.S., and K. W. Self were declared elected members.

It was announced that the London Natural History Society had presented a number of volumes and parts of the *Canadian Entomologist*. A vote of thanks was carried by acclamation.

EXHIBITS.

Mr R. F. HAYNES—A larva of *Apatele rumicis* L. found feeding on crab apple at Ashtead, Surrey.

Mr J. O. T. HOWARD—Pupae of *Cosymbia orbicularia* Hb. from larvae collected on willow in the New Forest, 22nd-26th September 1946.

Mr W. H. A. HARRIS—Specimens of about 30 species of butterflies and moths collected recently in South Wales. The insects appeared to be darker than those taken in S.E. England, particularly in the cases of *Maniola tithonus* L., *Lycæna phlaeas* L., and *Agrotis vestigialis* Hufn. Included in the exhibit was a specimen of *Thecla quercus* L. showing homoeosis.

Mr L. G. PAYNE—(1) The water fern *Azolla filiculoides* Lam. (Salvinaceae) from the River Colne at Uxbridge, Middlesex, (2) a living male specimen of *Hydrophilus piceus* L. from a pond in Essex where he had recently discovered a colony. He communicated the following note:

“ On 21st July 1946 the larva was shown me by Lt.-Col. Bensley, who was using a water net for mollusca. On 5th August a whole day on the same site failed to produce larvae or beetles and I came to the conclusion that this year's larvae were in the pupa stage. On 16th September two males were taken and two days later another male at the expense of a broken net. On 22nd September a final visit was paid—this time with an all-metal half-inch garden sieve in lieu of net. Two females were taken. Dominant water plants were a species of *Nitella* (Characeae, Stonewort) and a species of *Callitriche* (Haloragaceae). The two pairs are now in a 30-gallon glass tank and it is hoped that it may be able to record a complete life cycle of this interesting beetle.”

Dr J. A. WALKER—(1) An almost white form of *Amathes c-nigrum* L. from Wicken Fen, Cambs., and (2) *Argynnis euphrosyne*, ab. *xanthos* Froh.

The Secretary read letters from members giving their recent collecting experiences.

23rd OCTOBER 1946.

SPECIAL MEETING.

The PRESIDENT in the Chair.

Alterations and additions to the existing Bye-Laws were considered, and, after some amendments, approved.

After the business Mr S. N. A. JACOBS exhibited a series of *Popillia japonica* Newm. (Col. Scarabaeidae) from United States spring wheat in a steamer at the Royal Victoria Dock, London, during July.

Mr T. R. EAGLES exhibited: (1) Various stages in the development of the Earth Star fungus, *Geaster triplex* Jungh, and (2) Galls on Dogwood (*Cornus sanguinea* L.) caused by *Craneiobia corni* Kief. (Dipt., Cecidomyiidae) both from Mickleham Down, Surrey

26th OCTOBER 1946.

THE ANNUAL EXHIBITION—RECORD OF EXHIBITS.

The PRESIDENT opened the exhibition at 2.30 p.m. in the Libraries of the Royal Society and of the Royal Geological Society at Burlington House, Piccadilly, with the following address:—

Ladies and Gentlemen—It is a great pleasure to see such a good attendance once again at our Annual Exhibition.

Last year was made memorable by the large number of rare migrants which had been taken by our members and were on exhibition. This year there has been no such immigration to record, and, although a few specimens of *Pontia daplidice*, *Colias hyale* and *croceus* were reported

early in the season, the inclement weather evidently prevented their breeding in this country on any reasonable scale.

However, from what I have seen, our members and their friends have been far from idle, and I must take this opportunity of thanking all those who have brought exhibits this afternoon; for the success of this exhibition depends so largely upon the time and trouble devoted to the preparation of exhibits.

Since last year we have been provided with rooms in the basement for our Library and collections. These are open for inspection this afternoon, and the Society is most deeply indebted to the President and Officers of the Royal Society for their kindness in granting us this accommodation. This has enabled the Bright Collection to be brought back from Oxford, and it, too, is available for inspection.

Arrangements have been made for a few selected drawers to be on view upstairs, and the remainder can be seen downstairs.

I need not remind you that this represents an absolutely unique collection of the varieties of *Lysandra coridon*, together with similar lengthy series of all the varieties of *Lysandra bellargus* and *Polyommatus icarus*, which is of great interest to students of variation.

Some of you may have heard that we are still living on an austerity basis and that a system of bread-rationing has been introduced. At first, your Council were very doubtful as to whether it would be possible to provide tea in any form at all, but, thanks to the endeavours of our Honorary Secretary, it has proved possible to do so on a restricted basis. I must apologise for the fact that a limit has to be placed upon the quantity of eatables provided, but this is the result of circumstances beyond our control.

Last year I made some mention of the existing membership of the Society which stood, at that date, at 301. I stressed then, and I repeat again now, that a growing membership is the sign of a healthy society, and your Council is anxious to do all it can to encourage the election of new members.

Since the last Exhibition, 80 new members have been elected and I am very hopeful that, by the end of the year, we shall be able to record passing the 400 mark.

I am asked to announce that there will be an opportunity during the course of the afternoon for members who have not done so—particularly those resident in the country and who cannot often attend our regular meetings—to sign the Obligation Book.

It is a matter of great regret to your Council that one delay after another has occurred, so that the Societies' *Proceedings* for last year are not yet available for issue. Every endeavour was made to have them ready by to-day, but it has not proved possible, so I must ask your forbearance and only hope we can do better next year.

Finally, you will agree with me, I think, that we are greatly indebted to the President and Officers of the Royal Society for permission to use this Library for our Exhibition, and to the President and

Officers of the Royal Geological Society for the use of their Library as well, which opens out of the room in which we are now standing.

Last year it was found that even in this fine room our exhibits were a little crowded, and I hope that the additional space now available will enable members and their friends to examine the exhibits in greater comfort. I would ask you, if possible, to circulate freely round the tables and to hold discussions—which are such a valuable feature of the Exhibition—well clear of the tables on which the exhibits are displayed.

Ladies and Gentlemen—I have much pleasure in declaring the Exhibition open.

The following exhibits were shown:

Mr H. W. ANDREWS—A female of the Syrphid fly *Volucella zonaria* Poda taken by Mr C. M. Gummer at Deal, 23rd August 1946, with a female of *Volucella inanis* L. for comparison, also undersides of the two species.

Mr J. L. ATKINSON—*Melitaea athalia* Rott., variety closely approaching *navarina* Selys-Long, together with a typical example for comparison. *Nymphalis antiopa* L., taken at Tankerton, Kent, 19.8.1939. *Celerio livornica* Esp., taken at Tankerton, Kent, 21.9.1943.

Dr K. G. BLAIR—*Cosymbia pupillaria* Hbn., ♀, taken at Freshwater, Isle of Wight; new to the British fauna. Resembles *C. porata* F. but with more pointed tips to the forewings, these with the central spot white with a dark ring, the outer line of dots marked only by a costal dash; hindwings with a dark band as in *porata*, but no ring-spot. The colour is a uniform soft pinkish buff, with the dark strigulations and marginal spots of *porata* very faint.

Mr S. R. BOWDEN—*Lysandra bellargus* Rott.: Representative specimens from a Beds. locality, 1946 and previous normal years, tending to confirm the theory that females of this species are abnormally blue when they emerge after wet weather (cf. e.g. *Ent.*, 66, 282, 1933). (The 1946 specimens shown are all from the spring brood, but the autumn emergence was similarly blue. Extremely wet weather preceded both emergences.)

Miss WINIFRED M. A. BROOKE, F.L.S.—Sketches and Photographs of Flowers collected on the Mountains of Basutoland.

Mr F. D. BUCK—Three drawers of Australian beetles. There were over 100 species, mostly Buprestidae, which are very characteristic of the Australian continent. The genus *Stigmodera* was especially well represented and included the beautiful *S. suturalis* Don. (see Plate 15 in Tillyard, R. J., *The Insects of Australia and New Zealand*). There was also *Cyria imperialis* Don, which is figured on the same Plate.

Mr A. A. W. BUCKSTONE—*Polygonia c-album* L.: Dark smoky forms bred from Bookham, Surrey, ova, June 1946. Several of these specimens had black scales between the second costal spot and the spot near the inner margin, so forming a central transverse band as in ab. *polaris* Stdgr. of *Aglais urticae* L. One specimen had first and second costal spots linked by a black line. *Selenia bilunaria* Esp.: Long series

of spring, summer and autumn broods, bred and captured in Surrey. Several of the specimens of the autumn brood were intermediate between the spring and summer specimens.

Dr G. V. BULL—(1) A small collection of insects taken in July 1946, mostly at Westwell, Kent, but some at Wye and Ashford, Kent. These included *Deilephila porcellus* L., *Lygephila pastinum* Treit., *Gastropacha quercifolia* L., *Pheosia gnoma* F., *Polia advena* Schiff., *Itame wauaria* Esp., *Philereme transversata* Hufn., *Xanthorhoe quadrifasciata* Clrck. (2) Underside varieties of *Lysandra coridon* Poda taken at Wye in 1945 and 1946.

Mr S. G. CASTLE RUSSELL, on behalf of Colonel V. R. Burkhardt (late R.A.), D.S.O., O.B.E.—A series of *Argynnis euphrosyne* L. from West Surrey, May 1946, including one cream coloured ♂ and one "confluens" ♂ underside. Two "confluens" *Argynnis selene* Schiff., taken May-June 1946. One melanic *Erynnis tages* L., taken May 1946. One melanic and one black-bordered *Euphydryas aurinia* Rott., taken May 1946. A series of *Aphantopus hyperantus* L. taken in West Surrey, showing forms *lanceolata* Shipp., *fulva-parvi-puncta*, *crassi-puncta*, and *caeca* Fuchs, taken July 1946. One *Maniola tithonus* L. ♂ with two extra-ocellated spots on forewings. Two *Lysandra coridon* Poda ab. *glomerata* Tutt, taken on South Downs, August 1946.

Mr BRUCE BURNS—Lepidoptera taken or reared in 1946: *Macroglossum stellatarum* L., bred September; *Cerura vinula* L., females, taken in Gosport, Hants, in May; *Lasiocampa quercus* L., male and female, bred in July, from the many larvae collected off the privet hedges in his garden during the winter of 1945-46; *Saturnia pavonia* L., male and female, bred April; *Panaxia dominula* L., male, bred from Eastleigh, Hants, larvae in June; *Cilix glaucata* Scop., female, bred April from larva found at Eastleigh on hawthorn, October 1945; *Ectropis crepuscularia* Hb., found at rest on larch trunk, August, in the New Forest; *Ecliptopera silaceata* Schiff., taken at light, August, in the New Forest; *Selenia bilunaria* Esp., taken at light in the New Forest, July; *Argynnis paphia* L., female, August, near Minstead, New Forest; *Argynnis cydippe* L., female, found flying slowly over heather at Minstead, New Forest, in August; *Gonepteryx rhamni* L., male and female, August, New Forest; *Colias croceus* Fourc., female, October at Gosport; *Vanessa cardui* L., male, at Gosport in October on dahlia flowers; *Nymphalis io* L., female, New Forest, August, on bramble flowers; *Maniola tithonus* L., typical male and female, and male var. *pallidus* Froh., with the light brown ground colour replaced on all wings by pure white, New Forest, August; *Pararge aegeria* L., females New Forest, August; *Eumenis semele* L., male and female, Gosport, August, on rough heath. Living Larvae: Hibernating *Argynnis paphia* L., var. *valezina* Esp., larvae hatched on 24th August from ova laid on 8th August by a *valezina* from the New Forest; *Lasiocampa quercus* L., larvae obtained in his garden on privet hedges and Japanese honey-

suckle; *Macrothylacia rubi* L., larvae found feeding on bramble leaves at Gosport, 20th October.

Mr L. C. BUSHBY—Living specimens of:—Leaf Insect (*Phyllium pulchrifolium* Serv.). Adult males and females, together with immature forms. The adult males are winged and capable of taking short flights from bush to bush. In this species there is considerable range of colour, some specimens remaining green throughout their lives, while others are more suggestive of autumn leaves. This change of colour sometimes takes place in immature specimens. The eggs, very seed-like, are dropped haphazard on the ground and remain dormant for some months. The young, on hatching, are bright red. Praying Mantis:—An immature specimen of an undetermined species from Ceylon.

Mr S. A. CHARTRES—Varieties of *Lysandra coridon* Poda caught in East Sussex, including *ultra-radiata* B. & L., *mixta-elongata* B. & L., *digitata* Courv., and *glomerata* Tutt.

Mr L. CHRISTIE—A short series of *Lysandra coridon* Poda, including a male underside ab. *radiata* Courv. and a female with right forewing mainly of the colour of ab. *khaki* B. & L.

Dr E. A. COCKAYNE and Dr H. B. D. KETTLEWELL—Lepidoptera: (a) series of *Arctia villica* L., normal and ab. *wardi* Mathew, parents normal ♂ × *wardi* ♀; (b) series of *Abraxas grossulariata* L., parents normal ♂ (heterozygote) × ♀ resembling ab. *albomarginata* Rayn., offspring 5 normal, 9 homozygotes, 2 resembling *albomarginata*; (c) bred series of *Nonagria sparganii* Esp., from Freshwater, 1946, including abs. *rufescens* Tutt, *rosea* Wightman and *rufa* Wightman; (d) 3 *Nola albula* Schiff., Freshwater, 1946; (e) *Erannis aurantiaria* Hb., ab. *fumipennaria* Hellweger; (f) aberrations of *Abraxas grossulariata* L., from Huddersfield; (g) *Lasiocampa quercus* L., race *callunae* Palmer, F.2 generation, from N. Cornwall, including a dark ♀ ab. *fenestrata* Gerh.

Major A. E. COLLIER—Lepidoptera: (a) 3 examples of *Pararge megera* L., ♀ ab. *fascia* Froh., bred from a ♀ of this ab. taken in Northants in August 1944; out of 25 imagines 17 were females, and of these 10 were ab. *fascia*; (b) a halved gynandromorph of *Maniola jurtina* L., taken in Northants, 8.vii.1945; (c) a ♀ ab. of *Aphantopus hyperantus* L., taken in Yorkshire, 30.vii.1945, somewhat resembling in colour *Lysandra coridon* Poda, var. *cinnameus* B. & L.; (d) a ♀ ab. of *Aglais urticae* L., taken at Oundle, 20.viii.1942; (e) 4 examples of *Lysandra coridon* Poda, taken in Sussex; a gynandrous specimen, 11.vii.1946, a ♀ underside colour aberration, 15.vii.1946, a ♀ aberration, 29.vii.1946, and a ♂ ab. *striata* Tutt, 1.viii.1946.

Mr R. M. CRASKE and Mr J. C. B. CRASKE—A large number of aberrations of British Lepidoptera captured during 1946, including:—(1) *Lysandra coridon* Poda, a long series of aberrations including (a) ♂ colour forms *pulla* B. & L., *transformis* B. & L., *neutra* B. & L., *metallica*, *grisea* Tutt, *olivacea* B. & L., *viridescens* Tutt, *lavendula* B. & L.; (b) ♀ *lacticolor* Tutt, *irregularia* B. & L., *ultra-radiata* B. &

L., *obsoleta* Tutt and *striata* Tutt. (2) *Plebeius argus* L., a series of aberrations including (a) ♂ colour forms; (b) ♂ *radiata* Obth., *irregularis* Tutt and *juncta* Tutt forms; (c) ♀ colour forms; (d) ♀ *radiata* Tutt, *confluens* Tutt, *obsoleta* Tutt. (3) *Maniola jurtina* L., a series of 6 extreme aberrations including (a) gynandromorph, left side ♀, right side ♂; (b) ♂ with left hindwing showing thick black streaks on the underside extreme homoeosis. (4) *Maniola tithonus* L., ab. *mincki* Seebold. (5) *Argynnis selene* Schiff., a series of 9 aberrations including (a) ♂ cream ground; (b) ♂ extreme melanic form; (c) ♂ extreme confluent form. (6) *Argynnis euphrosyne* L., a series of 9 aberrations including (a) ♂ cream ground; (b) ♂ suffused forewings, ♂ suffused hindwings. (7) *Euphydryas aurinia* Rott., a series of aberrations captured 1946 in North Hampshire, including several extreme forms. (8) *Polyommatus icarus* Rott., aberrations including *limbo-juncta*, *albicosta* Tutt, *obsoleta* Clark and other forms. (9) *Pararge aegeria* L., colour forms including two aberrations having amber-coloured spots.

Mr W. DOWNES—*Maniola jurtina* L., ♀, taken in Sussex, 2.viii.46; ground colour pale drab, usual fulvous markings on forewings replaced with pure white. *Argynnis selene* Schiff., ♂, taken in Sussex, 7.vi.46; very similar to var. *margo-striata* Froh. but with more black marking on outer margin of forewings. *Nymphalis io* L., ♂, taken in Sussex, 4.viii.45; rear half of each hindwing heavily suffused with black. This suffusion ends in a sharply defined line running from the outer margin through the ocelli and finishing on the anal margin. *Leptidea sinapis* L., 2 ♂s, taken in Sussex, 2.viii.45 and 5.viii.45; gen. 2, usual black markings of the summer form replaced with brown.

Mr EVELYN A. J. DUFFY—(1) Living specimens of the following coleopterous larvae from Surrey: *Aulonium trisulcum* Gf. (from bark of elm near Croydon); *Lucanus cervus* L.; *Cetonia aurata* L. (with cocoons from a colony in an elm stump at Box Hill); *Ischnodes sanguinicollis* Pz. (from wood mould of fruit tree); *Prionus coriarius* L. (from roots of pine); *Strangalia maculata* Pod. (from birch stump); *Prionychus ater* F. (from wood mould of oak); *Nacerda melanura* L. (found breeding in large numbers in an old railway sleeper at Croydon). (2) Living adults of *Cetonia aurata* L., *Molorchus minor* L., and a live slow-worm. (3) Portions of various trees and plants exhibiting larval excavations of the following Longicornia (mostly from Surrey): *Prionus coriarius* L. (oak root); *Aromia moschata* L. (sallow stump); *Hylotrupes bajulus* L. (pine rafter); *Phymatodes testaceus* L. (oak bark); *Gracillia minuta* F. (dead bramble stems); *Molorchus minor* L. (spruce branch); *M. umbellatarum* Schb. (crabapple twigs and stems of dog rose) from Ashted; *Pogonochaerus hispidus* L. (apple twigs); *Mesosa nebulosa* F. (oak branch); *Agapanthia villosoviridescens* Deg. (pupal cells in umbel stems); *Saperda carcharias* L. (poplar stem). (4) Preserved adults of the following Longicorns (mostly from Surrey):—*Prionus coriarius* L., *Aromia moschata* L., *Criocephalus polonicus* Ms., *C. rusticus* L., *Asemum striatum* L. and v. *agreste* F., *Tetropium gab-*

rieli Wei., *Hylotrupes bajulus* L., *Callidium violaceum* L., *Phymatodes testaceus* L., *P. alni* L., *Clytus arietis* L., *Anaglyptus mysticus* L., *Gracillia minuta* F., *Molorchus minor* L., *M. umbellatarum* Schb., *Rhagium mordax* Deg., *R. inquisitor* L., *R. bifasciatum* F., *Stenochorus meridianus* Pz., *Leptura sexguttata* F., *L. scutellata* F., *L. cerambyciformis* Sk., *L. livida* F., *L. rubra* L., *Strangalia lurulenta* F., *S. 4-fasciata* L., *S. maculata* Pod., *S. nigra* L., *S. melanura* L., *Alosterna tabacicolor* Deg., *Grammoptera variegata* Gm., *G. ruficornis* F., *G. holomelina* Po., *Acanthocinus aedilis* L., *Leiopus nebulosus* L., *Pogonochaerus hispidus* L., *Mesosa nebulosa* F., *Agapanthia villosoridescens* Deg., *Saperda carcharias* L., *Saperda populnea* L., *Tetrops praeusta* L., *Phytoecia cylindrica* L., *Oberea oculata* L. (5) Various drawings and photographs depicting coleopterous life-histories.

Canon T. G. EDWARDS—Lepidoptera caught or bred during 1946: *Maculinea arion* L., a series taken in N. Cornwall; *Lycaena phlaeas* L., with reduced spotting, N. Cornwall; *Euplagia quadripunctaria* Poda, 2 specimens from S. Devon, typical specimen and orange variety; *Tiliacea citrigo* L., a series bred from Addington, Surrey, larvae; *Selenia tetralunaria* Hufn., a bred series of the Spring form, with the summer form bred from them showing 2 melanic varieties; *Cleora ribeata* Cl., bred from Box Hill, Surrey, larvae; *Nonagria typhae* Thunbg., bred from Ashtead, Surrey, larvae; *Dysstroma citrata* L., bred from Surrey larvae; *Aegeria muscaeformis* View., a series taken in N. Cornwall; *Platyptilia cosmodactyla* Hb., from N. Cornwall; *P. acanthodactyla* Hb., bred from Ranmore, Surrey, larvae; *Oidaematophorus carphodactylus* Hb., bred from Box Hill, Surrey, larvae; *Peronea cristana* Schiff., taken at Ashstead, Surrey.

Mr J. FINCHAM TURNER—*Hyloicus pinastri* L. from Suffolk, Dorset, and West Hants; *Papilio machaon* L., specimens from Wicken Fen, Cambs. and others reared from larvae found in a garden near Ringwood, Hants.; *Ectropis consonaria* Hb. ab. *waiensis* Richardson from the Forest of Dean; *Coenonympha pamphilus* L., a twin-spot variety from the New Forest; *Angerona prunaria* L. from Wellingborough, Northants.

Mr W. J. FINNIGAN—Lantern slides: 1. Lepidoptera (a) Larvae—*Strymon w-album* Knoch., *Laethoe populi* L., *Smerinthus ocellatus* L., *Deilephila elpenor* L., *D. porcellus* L., *Macroglossum stellatarum* L., *Gastropacha quercifolia* L., *Apatele rumicis* L., and *Geometra papilionaria* L. (b) Imagines—*S. ocellatus* L., *D. elpenor* L., *D. porcellus* L., *Pheosia tremula* Clreck, *Clostera pigra* Hufn., *G. papilionaria* L., and *Alucita galactodactyla* Schiff. (c) Ova—*S. w-album* Knoch. 2. Flowers—*Orobanche apiculata* Wallr. (=minor Sm.), *Orchis mascula* L., and *Ancmona nemorosa* L.

Mr L. T. FORD—Two drawers from his collection containing some 2500 moths of the genera *Nepticula* and *Lithocolletis*.

Messrs R. L. E. FORD and E. W. CLASSEY—A selection of preserved larvae of the British Lepidoptera, being the first instalment of their donation to the Society, including larvae of *Apatura iris* L., *Amathes*

ashworthii Doubl., *Hydrillula palustris* Hb., *Catocala sponsa* L., *Coenoteaphria sagittata* F., *Aegeria formicaeformis* Esp., *A. culiciformis* L., *A. myopaeformis* Bkl., *A. sphecoformis* Schiff., *Zygæna exulans* Hoch., and many others.

Mr H. W. FORSTER—A few scarce and local beetles taken in Epping Forest during 1945/6:—*Laemophloeus bimaculatus* Payk., *L. duplicatus* Walt., *Elater sanguinolentus* Sch., *Sericus brunneus* L., *Corymbites incanus* Gyll. var. *ochropterus* S., *Lyctus brunneus* S., *Phytoecia cylindrica* L., *Donacia clavipes* F., *Melasoma tremulae* F., *Chalcoides niti-dula* L., *Prionychus ater* F., *Conopalpus testaceus* Ol.

Capt. M. G. FRASER—Coleoptera: (a) Varietal forms—*Anomala aenea* Deg., a series from Freshfield, Lancs., showing gradation from typical to ab. *cyanea* To.; *Anaglyptus mysticus* L., one typical and one black form from Box Hill, Surrey; *Clytus arietis* L., one normal and one dwarf from Ruislip, Middlesex; *Xylodrepa 4-punctata* L., one typical and one semi-black form from Ruislip; *Phosphuga atrata* L., one typical and one red form from Mold, Flintshire. (b) The following species:—*Mesosa nebulosa* F., from Monkswood, Hunts.; *Lebia cyanocephala* L., from Monkswood; *Byctiscus populi* L., from Ruislip; *Pissodes notatus* F., from Formby, Lancs. (c) The following taken by Mr G. de C. Fraser—*Stenochorus meridianus* L., one typical and one large dark form from Monkswood; *Criocephalus polonicus* Mots., from Formby; *Monochamus titillator* F., from Cheshire; *Aromia moschata* L., from Formby; *Curabus nitens* L., from Formby; *Byctiscus betulæ* L., from Witherslack; *Magdalis carbonaria* L., from Witherslack.

Miss CAROL FRASER—Lepidoptera: (a) From Struan, Perthshire—*Cleora cinctaria* Schiff., *Chloroclysta siterata* Hufn., *Orthosia gracilis* Schiff., *Orthosia gothica* L. (b) From Aviemore, Inverness—*Gonodontis bidentata* Clerck, *Biston betularia* L., *Hyppa rectilinea* Esp., *Anarta melanopa* Thnbg., *Amathes alpicola* Zett. (*hyperborea* Zett.), *Hydriomena impluviata* Schiff. (*coerulata* F.), *Hydriomena ruberata* Frr., *Apatele leporina* L., *A. euphorbiae* F. var. *myricae* F. (c) From Freshfield, Lancs.—*Gonodontis bidentata* Clerck, *Apatele leporina* L. (d) From Llandudno, Caernarvonshire—*Eumenis semele* L. var. *thyone* Thompson, *Plebejus argus* L. var. *caernensis* Thompson. (e) From the Isle of Wight—*Alucita spilodactyla* Curt., *Nyctosia obstipata* F. (f) From Folkestone, Kent—*Aplasta ononaria* Fuessl.

Mr H. E. HAMMOND—(a) Four cases of preserved larvae of Lepidoptera, comprising 278 specimens, representing 187 species, preserved and mounted by the exhibitor, and including *Stauropus fagi* L., *Hydrilulla palustris* Hb., *Parascotia fuliginaria* L., *Heliothis peltigera* Schiff., *Sterrhia rusticata* Schiff., *Scopula immorata* L., and eight species of Clearwings; also a representative collection of the larvæ of the Papiliones, Sphinges, Bombyces, Agrotides and Geometrides were also shown, some in series exhibiting considerable variation. (b) One case of various Lepidoptera showing *Cleora repandata* L., a varied series ranging from typical to extreme melanic (some of the forms exhibited

are described in the "South" collection as "Birmingham form," and seem peculiar to the district); *Endromis versicolora* L. ab. *lapponica* Bau., bred from Aviemore parents, 1941; *Plusia chrysitis* L., with the gold replaced by green, Birmingham, 1944; *Polyommatus icarus* Rott., a dwarf form, Warwickshire, 1939; *Lycaena phlaeas* L. ab. *alba* Tutt, Birmingham, 3/10/41; *Plebejus argus* L., a small heath form from West Kent, 1941; *Apamea secalis* L., a heavily marked var. *I-niger* Haw., Birmingham, 1944; *Siona lineata* Scop., five males taken in East Kent, 1946; *Orthosia munda* Schiff., a short variable series, including vars. *geminata* Haw. and *immaculata* Staud., taken at Sallow, Warwicks., 1946; *Orthosia stabilis* Schiff., a dark banded form taken with *munda* (above); *Pieris brassicae* L. ab. *nigronotata* Jachn., Birmingham, 29/5/43; *Pieris rapae* L., two females with extra spotted hindwings, Birmingham, 1942, and Worcs., 1939; *Pieris napi* L., one banded female and one female showing black spots on one forewing and grey on the opposite (Shoreham, Kent, 3/8/45); one female with grey tips to forewings and spots of intense black causing the apical spots to appear unusually prominent (bred from Warwickshire female, 1944); one heavily banded ab. *citrona* Froh. (= *hibernica* Schmidt), bred 7/7/46 from Donegal stock; two albinos, banded *citrona*, bred by C. J. Willshee, 7/7/46; *Zygaena filipendulae* L. ab. *flava* Robson (= *cerinus* Robson & Gardner), Cotswolds, 6/8/39.

Commander G. W. HARPER, R.N.—Lepidoptera: the following were bred—*Apatura iris* L., from larvae, Romsey, Hants., and W. Sussex, July 1946; *Thecla betulae* L., from larvae, W. Sussex, August 1946; *Deilephila elpenor* L., from Hampshire, ♀, June 1946; *Laotoë populi* L., from ova, Rustington, Sussex, May 1946; *Smerinthus ocellatus* L., from Arundel, Sussex, ♀, August 1945 and May 1946; *Lasiocampa quercus* L. race *callunae* Palmer, 2 ♀♀ from pupae, Aviemore, Inverness, June 1946; *Endromis versicolora* L., from Aviemore, ♀, March 1946; *Nola cucullatella* L., from larvae, W. Sussex, July 1946; *Arctia caja* L., from larvae, Kyle of Lochalsh, Ross, and a pale ♀, Portsmouth, Hants., July 1946; *Dasychira fascelina* L., from larvae, Aviemore, July 1946; *Polia tineta* Brahm, from larvae, Aviemore, July 1946; *Apatele euphorbiae* F. var. *myricae* F., from pupae, Aviemore, May 1946; *Amathes alpicola* Zett. (*hyperborea* Zett.), 80% females, from larvae, Aviemore, June 1946; *Psodos coracina* Esp., from pupae, Aviemore, noteworthy as emerging in an "even" year, June 1946. The following imagines captured in 1946: *Euphydryas aurinia* Rott., from Hampshire, in May, minor variation but colour brighter than normal southern forms; *Nola albula* Schiff., from Angmering, Sussex, in July; *Phragmatobia fuliginosa* L. var. *fervida* Staud., an extreme southern form with little black colouration, from Angmering, in August; *Simyra albo-venosa* Gze., from Angmering (an unusual locality), in August; *Cryphia muralis* Forst., from Rustington, in August; *Anarta cordigera* Thnbg. and *A. melanopa* Thnbg., from Aviemore, in May; *Ennomos autumnaria*

Wernb., from Rustington, in September, where it occurred quite commonly at light.

Mr C. N. HAWKINS—Lepidoptera: *Cryphia perla* Fabr., a heavily blackish-suffused specimen from Ashted, Surrey, 1946, and another with orange-buff ground colour from Wimbledon, 1946. Coleoptera: *Prionus coriarius* L., from Wimbledon Common, 1945 and 1946, 1 male and 3 females.

Mr G. C. HOLROYD—Lepidoptera: *Apatura iris* L., a ♂ and 2 ♀♀ bred from ova (W. Surrey and W. Sussex), 1940-41-45; *Polyommatus icarus* Rott., a ♀ underside var. taken at Shere, Surrey, 10.vi.1935; *Aphantopus hyperantus* L., 2 specimens of ab. *caeca* Fuchs, taken in Dorset, July 1946, a third taken in W. Sussex by Mr N. Pilleau in 1944; *Pieris napi* L., a ♂ with black spot on left forewing, missing from right forewing, taken at Ball's Cross, Sussex, 17.v.1936; *Maniola tithonus* L., a ♂ with the black spots on the forewings reduced and the inner white dots absent, taken at Cutt Mill, Surrey, 27.vii.1936, and another with forewings tinted light straw colour, taken in W. Sussex in 1937; *Lycaena dispar* Haw. subspecies *rutilus* Wernb., 4 specimens of Berlin origin, bred 1933; *Polygonia c-album* L., a specimen with the comma almost absent, bred in 1942 from a larva taken on currant at Woking; *Lycaena phlaeas* L. ab. *obsoleta* Tutt, a ♂ captured in W. Sussex in 1937.

Captain R. A. JACKSON, R.N.—Three cases and a drawer containing: (a) Examples of *Euphydryas aurinia* Rott. from a very strong new colony in Hampshire, showing development of light and dark forms in its second year (see *Butterflies* by E. B. Ford, pages 268-270). (b) Broods of hybrids of *Lycia hirtaria* Clrck. and *Poecilopsis lapponaria* Bdv.; hybrids *wallacei* Harrison and *leesei* Harrison. In the case of the former no female appeared as against 10 males, and in the latter only one female as against about 50 males. A number of pupae were lying over. (c) Varied undersides of *Aphantopus hyperantus* L.; varieties of *Argynnis euphrosyne* L.; a female variety *albida* Russell of *Maniola tithonus* L. from Salisbury; a very dark underside of *Pararge aegeria* L.; minor variations of *Lysandra coridon* Poda, and a series of chalk forms of *Plebejus argus* L. (d) Series of *Brachionycha nubiculosa* Esp.; *Agrotis cinerea* Hb., including very dark forms; *Amathes alpicola* Zett. (= *hyperborea* Zett.); *Arenostola phragmitidis* Hb.; *Ortholitha scotica* Cckne., including chocolate-coloured forms; *Cleora cinctaria* Schiff., bred from Struan ova; *Philereme vetulata* Schiff.; *Panolis flammea* Hb., including a greenish form; *Biston betularia* L., including two intermediates between the normal and black forms; *Electrophaes corylata* Thnbg., white Scotch forms, contrasted with Southern type; examples of *Hydroecia oclea* L., *H. paludis* Tutt, and *H. crinanensis* Burrows; two *Plusia gamma* L. of the North European form, taken in Hampshire in July; a melanic variety of *Chiasmia clathrata* L. contrasted with variety *nocturnata* Fuchs; two soft dark grey forms of *Ectropis bistortata* Goeze (second brood); a male *Orthosia stabilis*

Schiff. with a very pronounced white sub-marginal line; a female *Hadena glauca* Hb. with pronounced yellow markings.

Mr S. N. A. JACOBS—Mounted leaf mines of the following species of Microlepidoptera: *Nepticula rhamnella*, Altaussee, Austria, 16.ix.46; *N. mahalebella* Klim., Trento, 2.xi.45; *N. sativella* Klim., Trento, 20.ix.45; *N. nigrosparsella* Klim., Trento, 2.xi.45; *N. obliquella* = *diversa*, Trento, 10.xi.45; *N. staphylaeae* Zimmeren, Gumpoldskirichen, Austria, 25.vii.42; *N. mespilicola* L., Trento, 25.ix.45; *N. promissa* Staud., Trento, 20.x.45; *Lyonetia frigidariella* H.-S., Dachstein, Austria, 2000 m., 31.vii.39; *Cemistoma phyllocytisi* Her., Trento, 20.x.45.

Mr J. M. JAKES—A drawer of microlepidoptera taken during 1946, including some from Aviemore, Inverness.

Col. S. H. KERSHAW—A series of *Lysandra coridon* Poda taken at Royston, Herts., by S. H. & R. M. Kershaw; also two varieties of *Aglais urticae* L. bred by Mr James Barnwell under natural conditions in the open, from May larvae. Two thousand insects were bred, but only two varieties appeared, both on 14th June 1946.

Dr H. B. D. KETTLEWELL—1. A series of 15 *Pontia daplidice* L. ab. *belidice* including 3 aberrations. Bred from ova found wild and deposited by females from Falmouth. These individuals failed to pair in contrast to their confrères which hatched in the autumn of 1945. 2. A series of 18 *Panaxia dominula* L. aberrations. A new form having the apex of the forewing nearly all-white, and with the sub-apical blotch continuous with the spot of the anal angle, both much enlarged. Hindwings practically devoid of all black markings except for centre spot. 3. A series of *Arctia villica* L. aberrations including a pair ab. *wardi* Math. (paired, and gave fertile ova), two (both females) with jet black forewings but with body slightly yellow, two with banded hindwings and several with apical blotchings. 4. A series of 23 *Arctia caja* L. aberrations including yellow hindwing, heterozygotes of ab. *fumosa* Hörhammer. 5. Two *Papilio machaon* L. sub-species *gorganus* Fruh., bred from larvae found feeding wild on carrot, August 1945, Newport, Isle of Wight. 6. A series of *Nonagria sparganii* Esp., bred from wild pupae, South Devon. 7. An aberration of *Ematurga atomaria* L. with slightly speckled yellow ground colour, but with the four transverse bands standing out in relief. Taken wild, Sussex, 1946. 8. Two specimens of *Earophila badiata* Schiff., with white bands across forewings, taken wild at light, Cranleigh, 1946.

Dr HAROLD KING—*Leucania l-album* L., *Aporophyla nigra* Haw., *A. lutulenta* Schiff, and *Laphygma exigua* Hb. from Dawlish, Devon; *Apamea oblonga* Haw., *Sesia apiformis* Oreck., *Zanclognatha cribrumalis* Hb., and *Sterrhia ochrata* Scop., from East Suffolk; *Atethmia xerampelina* Hb. from Bucks.; *Herminia barbalis* Oreck. and *Siona lineata* Scop. from Kent; a variety of *Aricia agestis* Schiff. from Hertfordshire.

Mr B. J. MACNULTY—Lepidoptera: Short series of *Triphaena pronuba* L. and *Lampra fimbriata* Schreber showing parallel forewing varia-

tion, and a selection of specimens taken in South Wales in 1945 and 1946, including *Pontia daplidice* L., bred Spring 1946, from ova laid July 1945; *Macroglossum stellatarum* L., one of the specimens having been caught flying, 16.xii.1945, on an overcast day with an east wind; *Callimorpha jacobaeae* L. with the line and spot on forewing joined; *Apatele menyanthidis* View., *Eumichtis lichenea* Hb., *Gortyna flavago* Schiff., *Atethmia xerampelina* Hb., *Cucullia chamomillae* Schiff., *Discoloxia blomeri* Curt., *Abraxas grossulariata* L., a very light form; *Selenia tetralunaria* Hufn., *Cleora repandata* L., a banded form.

Rev. J. N. MARCON—Varieties of Butterflies: (1) Taken in 1945—*Argynnis selene* Schiff. var. *morphisa* Spängberg and unnamed vars. as follows: (a) a black variety; (b) with the outer spots joined with the submarginal row in all four wings; (c) spots joined on the hindwings only; (d) a banded form; (e) a banded form with black suffusion; (f) a black suffused form of the var. *margo-striata* Froh.; (g) one with white markings; *Argynnis cydippe* L., two males, vars. *bronzus* Froh. and *charlotta* Haw.; *Argynnis paphia* L., a variety similar to var. *ater-marginalis* Froh. of *A. euphrosyne* L.; *Lysandra coridon* Poda, 2 gynandromorphs; an unnamed form, underside covered with black spots all over, slightly streaking some of the spots, perhaps unique, and vars. *livida* B. & L. ♂, *brunnescens* Tutt ♂, *striata* Tutt, *postalba* B. & L. ♂, *caeca* Courv. ♂, *grisea* Tutt ♀, *syngrapha* Kef., *extrema* Courv. ♀, *digitata-nigrescens* B. & L., *transversa* Courv., *obsoleta* Tutt (two females), *post-caeca* B. & L., *ultra-radiata* B. & L. male. (2) Taken in 1946: *Argynnis euphrosyne* L., a variety similar to var. *flava-pallidus* Froh. of *A. selene* Schiff.; *Argynnis selene* Schiff., similar varieties to those taken in 1945 but including a heavily banded form of the male; *Pieris napi* L., two handed undersides, also a heavily banded ab. *hibernica* Schmidt (= *citrona* Froh.) female, and three albinos, one an ab. *hibernica* female of an unusual shade, one a white ordinary form, and one a banded ab. *hibernica*; *Lysandra coridon* Poda, three vars. *digitata* Courv., one *tri-i-nigrum* B. & L. and two gynandromorphs.

Messrs W. E. MINNION and B. S. GOODBAN—Lepidoptera: *Cerura bicuspis* Bkh. from Coldridge, Devon, May 1943; *Calothyranis amata* L. from Banstead, Surrey, July 1945, with displaced band on left hindwing; *Amphipyra pyramidea* L. from Ruislip, Middlesex, July 1946, with bilateral variation; *Zanthorhoe fluctuata* L. from Pinner, Middlesex, May 1945, with smoky bands; *Apatele aceris* L. varieties from Cranham, Essex, June 1945, Rickmansworth, Herts., June 1944, and Ruislip, June 1946; *Lycaena phlaeas* L. from Ashted, Surrey, August 1939, approaching var. *schmidtii* Gerh.; *Procus furunculus* Schiff. from Cranham, Essex, July 1944, with unusually dark "cloak"; *Saturnia pavonia* L. from Byfleet, Surrey, April 1945, with inward curve of costa; *Polygonia e-album* L. from Ruislip, July 1945, a dark form; *Maniola jurtina* L. from Boxhill, Surrey, August 1946, with left forewing bleached; *Pararge megera* L. from Cranham, Essex, ♂ with pale ground colour and very small, ♂ with reduced "eye" spots; *Pseudoips bicolor*

rana Fuessl. taken in Regent's Park Barracks, Albany Street, N.W.1, July 1945, at light; *Cleora rhomboidaria* Schiff. from Banstead, a totally melanic specimen found in a spider's web.

MR A. M. MORLEY—Lepidoptera taken in 1945 and 1946: (1) Kent, 1946 (all in or near Folkestone, except where otherwise mentioned)—*Polyommatus icarus* Rott., 2 very blue ♀♀, ♂ underside var. *flavescens* Tutt; *Lysandra coridon* Poda, upperside vars. ♂ *caerulea* Neust., ♂ *viridescens* Tutt, 3 ♂♂ *pulla* B. & L., ♀ *atrescens* Tutt, ♀ *cinnamomeus* B. & L., underside vars. ♂ *post-caeca* B. & L., ♂ *discoelongata* Courv., ♀ *caeca* Courv. with curiously shaped hindwings, ♀ *nigrescens-discreta* B. & L., ♀ *ultranubila* B. & L.; *Maniola jurtina* L., ♂ underside with eyespots on hindwings; *Nymphalis polychloros* L., 18th August; *Aegeria chrysidiformis* Esp., ♂ and ♀; *Aegeria scopigera* Scop., ♀; *Cryphia perla* Schiff., 3 vars.; *Orthosia gracilis* Schiff., varied series from Romney Marsh; *Plusia gamma* L., "pink" form and small form (*gammina* Stgr.); *Heliothis peltigera* Schiff., pale form; *Euclidimera mi* Clrck., typical, and forms *litterata* Cyrilli and *extrema* B.-Haas; *Hypena proboscidalis* L., dark form; *Aplasta ononaria* Fuessl., ♂ and ♀; *Scopula nigropunctata* Hufn., 27th July; *Pyrausta nubilalis* Hb., one, 10th July, and one 27th July. (2) Kent, 1945—*Pontia daplidice* L., Thanet; 6 *Colias hyale* L., ♂ and ♀, ♂ underside with greenish tint, all third brood, Folkestone, October; *Colias croceus* Fourc., exceptionally large ♂, third brood, Folkestone, and var. *helicina* Oberth., lemon coloured, Thanet; *Maniola jurtina* L., two aberrations, Folkestone; *Nymphalis polychloros* L., taken in February at Folkestone station; *Lysandra coridon* Poda, upperside vars. ♂ *caerulea* Tutt, ♂ *viridescens* Tutt, ♀ *ultra-albocrenata* B. & L., underside vars. ♂ and ♀ *ultranubila* B. & L., ♂ *costajuncta* Tutt, ♂ *caeca* Courv., 2 ♂♂ each with one discoidal missing; *Thymelicus lineola* Och., apparently the first recorded from Romney Marsh; *Zygaena filipendulae* L., with confluent spots (Folkestone); *Procris globulariae* Hb., ♂ ♀, near Dover; *Cryphia perla* Schiff., various forms from Folkestone, including one with orange instead of the usual grey markings; *Procus versicolor* Bkh., 7th June, Folkestone; *Plusia gamma* L., dark form; *Hypena proboscidalis* L., second brood; *Aplasta ononaria* Fuessl., 2 second brood. (3) Aviemore, Inverness, 1946, illustrating local forms or species—*Pieris napi* L., ♀, 2 undersides; *Pieris rapae* L., yellowish male; *Argynnis euphrosyne* L., ♂ ♀; *Pheosia gnoma* F., ♀, bred; *Drepana falcataria* L.; *Drepana lacertinaria* L., ♂ ♀; *Apatele euphorbiae* Schiff. var. *myricae* Guen., ♂ ♀; *Apatele menyanthidis* View.; *Hadena serena* Schiff.; *Hadena conspersa* Schiff.; *Amathes alpicola* Zett. (*hyperborea* Zett.), bred series of 7; *Ochropleura plecta* L.; *Orthosia gothica* L., dark form, bred; *Hyppa rectilinea* Esp., banded form; *Eumichtis adusta* Esp.; *Ortholitha scotica* Ckne., series of 8; *Chesias rufata* F.; *Hydriomena impluviata* Schiff. (*coerulata* F.), 3 forms; *Hydriomena ruberata* Frr., ♂ ♂; *Cosymbia porata* F.; *Xanthorhoe fluctuata* L., grey form; *X. spadicearia* Schiff.; *Thera cognata* Thnbg., 2 bred; *Electrophaes corylata*

Thnbg.; *Cabera exanthemata* Scop.; *Eupithecia tantillaria* Boisd. (= *pusillata* Schiff.); *Eupithecia helveticaria* Boisd. (4) Aviemore, 1945—*Maniola jurtina* L., ♂ ♀, and ♀ underside; *Coenonympha tullia* Müll., ♂ ♀, and ♂ underside; *Argynnis selene* Schiff., ♂ ♀, and ♂ underside; *Aricia agestis* Schiff., form *artaxerxes* F., ♂ ♀, and ♀ underside; *Polyommatus icarus* Rott., series of 5 rather like the Irish form; *Tethea duplaris* L., dark form; *Apatele psi* L.; *Lycophotia varia* de Vill. (= *strigula* Thnbg.); *Ochropleura plecta* L.; *Diarsia brunnea* Schiff.; *D. festiva* Schiff.; *D. rubi* View.; *Amathes baja* Schiff.; *A. xanthographa* Schiff., black form; *Graphiphora augur* F.; *Diaturaxia oleracea* L.; *Ceramica pisi* L.; *Polia nebulosa* Hufn.; *Apamea monoglypha* Hufn., ♀ brown, ♂ dark brown, ♀ black; *Plusia pulchrina* Haw.; *P. festucae* L.; *P. interrogationis* L.; *P. bractea* Schiff.; *Ortholitha mucronata* Scop., 3 dark specimens; *Gnophos myrtillata* Thnbg.; *Lygris populata* L., rather dark; *Dysstroma truncata* Hufn.; *Entephria caesiata* Schiff.; banded form; *Colostygia salicata* Hb.; *Eupithecia goossensiata* Mab.; *Psodos coracina* Esp., 2 of each sex.

MR CHARLES DE MORNAY—Original drawings for an educational film strip carried out from actual specimens by the exhibitor. The film strip was produced by National Interest Picture Productions Ltd. to illustrate the external structure and the life-history of *Papilio machaon* L. (Note.—The film strip was shown to members on 8th January 1947.)

MR H. A. MORRELL—Lepidoptera from Surrey localities, taken or bred during 1946: *Colias croceus* Fourc., taken in own garden, Cheam, 7th October; *Lysandra coridon* Poda, Banstead Downs, 26th July, all wings with very dark margins and with dark suffusion; *Procris statice* L., Ashted, 24th June; *Drepana lacertinaria* L., dark form, at rest on a fence, Coombe, 7th May; *D. falcataria* L., at rest on a fence, Cheam, 20th May; *Panolis flammea* Schiff. (*griseo-variegata* Gze.), at rest, Coombe, 29th April; *Hadena conspersa* Schiff. var. *schultzi* Seitz, at rest on a fence at Coombe, 4th June; *H. thalassina* Hufn., at rest on a fence at Cheam, apparently the first record for the locality; *Thera obeliscata* Hb. var. *obliterata* B. White, at rest on a fence at Coombe, 4th June; *Erannis leucophaearia* Schiff., modification of ab. *merularia* Weym., Coombe, 19th February; *Colotois pennaria* L., bred from Ranmore larvae, emerged 9th October; *Hemistola chrysoprasaria* Esp. (*vernaria* Hb.), Cheam, 12th July; *Oporinia dilutata* Schiff. ab. *melana* Prout, bred from Ashted larvae in October; *Tethea ocularis* Guen., at rest on a fence, Wallington, 7th July; *Apatele rumicis* L., at rest on a fence, Coombe, 17th May; *Acasis viretata* Hb., at rest on a fence, Sutton, 28th August; *Cleora ribeata* Clrk. (*abietaria* Schiff.), bred from Box Hill larvae in July.

MR L. HUGH NEWMAN—(1) Two show cases of foreign silk moths reared in this country. (2) Two cages of living larvae of Indo-Australian Saturniidae: *Actias selene* Hb. feeding on hawthorn and *Philosamia cynthia* Dry. feeding on privet.

Mr D. A. ODD—A collection of Working Bees and their Cuckoos. This collection was exhibited on behalf of Mrs R. Horsburgh of Reigate, Surrey, the sister of the late W. W. Saunders, who made the collection. He was a son of Edward Saunders, the author of *The Hymenoptera Aculeata of the British Islands*, 1896, and *The Hemiptera-Heteroptera of the British Islands*, 1892, etc.

Messrs G. B. OLIVER and G. H. OLIVER—A series of *Pieris napi* L. showing banded forms of var. *hibernica* Schmidt (= *citrona* Froh.) reared in April, June, and late July 1946. *Maniola jurtina* L., a male var. *anommatata* Verity from Bucks. *Eysandra coridon* Poda var. *pallidula-metallica* B. & L., male, from Bucks. and var. *pulla* B. & L., female, from Sussex, set underside to show the blackish body, legs, and head. *L. bellargus* Rott., two males and one female of the var. *transversa* B. & L. from Kent and Bucks. *Melitaea athalia* Rott., a large male with light straw ground colour, from Kent.

Mr R. W. PARFITT—Selection of Lepidoptera: (1) Bred during 1946—*Euphydryas aurinia* Rott., Surrey; *Lymantria monacha* L., Surrey; *Dasychira fascelina* L., Surrey; *Achlya flavicornis* L., Berks. (2) Taken during 1946—*Setina irrorella* L., Surrey; *Pheosia tremula* Clerck, Surrey; *Notodonta anceps* Goeze, Surrey; *Brephos notha* Hb., Surrey; *Heliophobus saponariae* Esp., Surrey; *Aphantopus hyperantus* L. var. *caeca* Fuchs, Dorset; *Hydrillula palustris* Hb., Hunts.; *Apamea unanimis* Hb., Hunts.; *Aporophyla nigra* Haw., Dorset; *Omphaloscelis lunosa* Haw., Dorset; *Leucochlaena hispida* Gey., Dorset; *Cleora lich-enaria* Hufn., Dorset; *Eulia formosana* Hb., Surrey. The last named new to the British List.

Mr L. G. PAYNE—The Coleopteron, *Stenopelmus rufinus* Gyll., and added the following note: "This interesting beetle was first taken in 1921 on the Norfolk Broads and is recorded in *Ent. Mo. Mag.* of that year. The host plant is *Azolla filiculoides* Lam., a free-floating aquatic, originally a North American plant, but for many years well established in this country. The beetles exhibited were taken from the River Colne in Middlesex on 20.10.46. *Stenopelmus* is described and figured in *Additions to British Coleopterous Fauna*, Donisthorpe, 1921."

Mr E. B. PINNIGER, F.R.E.S.—Rare British Odonata: (1) *Gomphus vulgatissimus* L., ♂ ♀, New Forest, 1946; (2) *Sympetrum fonscolombii* Selys, ♂, Enfield West, 1946; (3) *Aeshna isosceles* Müller, ♂ ♀, Norfolk, 1937; (4) *Somatochlora metallica* Van der Linden, ♂ ♀, Byfleet, Surrey, 1935; (5) *Libellula fulva* Müller, ♂ ♀, Norfolk, 1937; (6) *Lestes dryas* Kirby, ♂ ♀, Benfleet, Essex, 1936. One male and two females of *Coenagrion scitulum* Rambur, a species new to Britain, taken in S.E. Essex by E. B. Pinniger on 21st July 1946, and identified by Miss C. E. Longfield.

Mr C. G. PRIEST—A series of *Sphinx ligustri* L.

Mr W. QUBELL—*Eumenis semele* L., examples of both sexes showing considerable extension of the pale markings, a female with enlarged spots blind, and another with extra spots on the forewing, all from

Wiltshire. A varied series of *Amathes alpicola* Zett. (= *hyperborea* Zett.), including some very dark forms, from Aviemore, Inverness. Also from the same locality the following:—*Ortholitha scotica* Ckne., including dark forms; *Hydriomena impluviata* Schiff., including melan examples; *Dysstroma citrata* L., *Plusia pulchrina* Haw., and *Thera cognata* Thnbg.

Mr H. RAY—Butterflies recently collected in the Winchester, Hants., area showing variation in size, colour, and markings. The following is his description and explanation of the exhibit:

" 1. *Variation in Size*—Arrested development in the larva state, due to climatic and other causes, is probably the primary variant in regard to size, but subsequent hereditary factors interact with one another to produce dwarf specimens when all conditions are otherwise favourable for normal development. Hereditary variation of size is quite common in some species, e.g., *Euchloe cardamines* L., *Pieris napi* L., etc., but *Gonepteryx rhamni* L. is usually very constant in this respect, as it is in colour and marking, possibly due, in part, to a freer dispersal. For this reason the dwarf specimen shown is considered to be the effect of the primary cause and therefore interesting as the result of this year's exceptional summer weather. *Extracts from data records*:—(i) *Euchloe cardamines* L.: (a) Normal, ♀, Bishopstoke Woods, 22/4/46, wing span 44.3 mm.; (b) dwarf, ♀, Bishopstoke, 20/5/45, wing span 35.3 mm. (ii) *Pieris napi* L., spring brood: (a) Normal, ♂, Bishopstoke Woods, 14/4/46, wing span 44.7 mm.; (b) dwarf, ♂, Bishopstoke Woods, 21/4/46, wing span 35.5 mm. (iii) *Gonepteryx rhamni* L., summer brood: (a) Normal, ♀, Bishopstoke Woods, 11/8/46, wing span 56.0 mm.; (b) dwarf, ♀, Bishopstoke Woods, 1/9/46, wing span 45.9 mm.

" 2. *Variation in Colour and Marking*—Variation of colour and marking is due to heredity. The var. *helice* Hb. of *Colias croceus* Fourc. is a well-known example of sex-controlled inheritance in the female. The specimen shown, ab. *pallida* Tutt, is a variation of the variant form. Certain species of *Argynnis* are subject to albinism, the whole rich brown ground colour becoming almost pure white, ab. *xanthos* Froh. This appears to be an example of simple recession. The specimen shown is one of two taken at the same spot within two days of one another.

" The absence of rings or dots on the underside of *Aphantopus hyperantus* L. is a character of great variability. It is considered that the specimen shown, without central spots, is the var. *caeca* Fuchs, as Seitz holds that var. *arete* Mill. should be the name used for specimens in which the rings only are absent. Dr E. B. Ford (*British Butterflies*, 1945) considers this variation to be due to multi-factor inheritance and therefore rare.

" *Extracts from data records*—(iv) *Colias croceus* Fourc.: (a) Typical female, Fair Oak, Hants., 29/7/1945; (b) var. *pallida* Tutt, female, Fair Oak, 21/9/1946. (v) *Argynnis euphrosyne* L.: (a) Normal male,

Bishopstoke Woods, 14/5/1946; (b) ab. *xanthos* Froh., Bishopstoke Woods, 23/5/1946. (vi) *Aphantopus hyperantus* L.: (a) Normal underside male, Sparsholt, Hants., 8/7/1946; (b) var. *caeca* Fuchs (?arete Mill.) male, 8/7/1946. One of two taken within a few yards of one another, the other specimen being damaged but completely immaculate.

Mr AUSTIN RICHARDSON—Three drawers containing Lepidoptera taken or bred in 1946, in many cases accompanied by preserved larvae. Drawer 1: Scottish series—*Apamea furva* Schiff.; *Amathes castanea* Esp., red and pink forms; *Eurois occulta* L., one specimen being the grey form; *Apamea exulis* Lefeb., black, red and yellowish forms; *Aporophylla lutulenta* Schiff., two being ab. *sedii* Guenée and two ab. *lunenburgensis* Freyer; *Amathes alpicola* Zett. (= *hyperborea* Zett.) picked from 100 bred from April larvae, including one extreme melanic form. Drawer 2: a series of *Pieris napi* L. from Scotland, two being of the first brood, showing heavily suffused ♀♀; 4 *Pontia daplidice* L. ab. *bellidice* Oberthür bred from pupae found in Cornwall; 14 aberrations of *Argynnis euphrosyne* L. from Gloucestershire and Worcestershire; bred series of *Thecla betulae* L. from Oxford; series of *Polyommatus icarus* Rott. with a ♂ ab. *caeca* Gillmer and *Aricia agestis* Schiff. race *artaxerxes* F., both from Scotland; 9 *Spilosoma lubricipeda* L. (*menthastri* Esp.) aberrations from Gloucestershire; a bred series of *Trichiura crataegi* L. from Oxford, with 3 blown larvae showing variation; a series of dark vars. of *Ceramica pisi* L. from Scotland; 3 *Leucania unipuncta* Haw. with infertile ova from Cornwall; an aberration of *Celaena haworthii* Curt. from Scotland; 1 *Colobochyla salicalis* Schiff. from Kent; a banded aberration of *Boarmia roboraria* Schiff. and an aberration of *Opisthograptis luteolata* Hb., both from Gloucestershire; a series of *Semiothisa notata* L. from Kent and Sussex; an aberration of *Angerona prunaria* from Kent; a variable series of *Hydriomena impluviata* Schiff. from Scotland; a series of *Euphyia rubidata* Schiff., taken and bred, and a bred series of *Selenia lunaria* Schiff., including ab. *delunaria* Hb., all from Gloucestershire. Drawer 3: an exhibit to illustrate melanism in the Geometrid moths of Gloucestershire, previously shown at the centenary meeting of the Cotswold Naturalists' Field Club, July 1946—*Semiothisa liturata* Clrck. with ab. *nigrofulvata* Collins; *Chiasmia clathrata* L. with ab. *nocturnata* Fuchs; *Eupithecia albipunctata* Haw. with ab. *angelicata* Barr.; *Eupithecia castigata* Hb. with ab. *obscurissima* Prout and an intermediate; *Eupithecia abbreviata* Steph. with ab. *hirschkei* Bastlb. and intermediates; *Chloroclystis rectangulata* L. with ab. *nigrosericeata* Haw.; *Colotois penaria* L. with a melanic aberration; *Erannis defoliaria* Clrck. with ab. *obscurata* Stdgr.; *E. marginaria* F. with ab. *fuscata* Mosley; *E. leucophaearia* Schiff. with abs. *marmorinaria* Esp. and *merularia* Weym.; *Phigalia pedaria* F. with ab. *monacharia* Stdgr.; *Biston betularia* L. with ab. *carbonaria* Jord. (= *doubledayaria* Mill.) and intermediates; *Cleora repandata* L. with abs. *conversaria* Hb. and *nigricata* Fuchs; *Ectropis bistortata* Goeze with ab. *defessaria* Frr.; *E. crepuscularia*

Hb. with abs. *delamerensis* B. White and *nigra* Th.-Mg.; *E. consonaria* Hb. with abs. *vaiensis* Richardson and *nigra* Banks.

Dr G. S. ROBERTSON—*Leucania l-album* L. from near Torquay, Devon; *L. albipuncta* Schiff. from West Sussex; *Nonagria neurica* Hb. from East Sussex; *Apamea monoglypha* Hufn. var. *infusata* Mardale from the Lake District; *Hadena conspersa* Schiff. from West Sussex; and *H. albimacula* Bkh. from S.W. Kent.

Mr ARCHIBALD G. B. RUSSELL—A selection of moths taken in his light trap at Swanage, Dorset, from the Autumn of 1945 to the end of the Summer of 1946, all single specimens unless otherwise stated: *Smerinthus ocellatus* L., two males; *Acherontia atropos* L.; *Herse convolvuli* L., three males and two females; *Hyloicus pinastri* L., two males; *Stauropus fagi* L., three males; *Agrotis clavis* Hufn. (= *corticea* Hb.) ab. *brunnea virgata* Tutt and ab. *nigra* Tutt; *A. cinerea* Hb. ab. *brunnea* Tutt; *A. puta* Hb., a female ab. *nigra* Tutt; *A. exclamatoris* L., a female of a remarkable aberrational form (which does not appear to have been named) with both fore and hindwings black; *Amanogrotis lucerneae* L. ab. *renigera* Steph.; *Amathes xanthographa* Schiff. ab. *nigra* Tutt; *Hadena nana* Hufn. ab. *latenai* Pierr., a melanic mountain form occurring in Switzerland and the Hebrides, and unexpectedly met with in Dorset; *Tholera cespitis* Schiff., a female with pale grey forewings and a typical female for comparison; *Leucania l-album* L., one taken in October 1945 and two in July 1946, interesting as showing the eastward spread of the insect; *L. vitellina* Hb., three; *L. albipuncta* Schiff.; *Meristis trigrammica* Hufn. ab. *semifusca* Haw.; *Laphygma exigua* Hb., eight; *Cirrhia gilvago* Schiff. ab. *suffusa* Tutt; *Heliothis peltigera* Schiff., six; *H. armigera* Hb. ab. *fusca* Ckll. (taken 1st November 1945); *Plusia gamma* L., a rare aberration with the "gamma" broken as in *P. iota* L.; *Rhodometra sacraria* L. ab. *sanguinaria* Esp., in bred condition, taken 5th November 1945; *Xanthorhoe ferrugata* Clrck., a curious aberrational form with the central area of the fore and hindwings white, dark grey predominating in the marginal and basal portions; *Nyctosia obstipata* F., four males and four females, one of the latter of a light pink tint both in fore and hindwings. A series of twelve *Sedina buttneri* Hering, taken at Freshwater, Isle of Wight, in September and October 1946, together with a small female specimen of *Rhizedra lutosa* Hb., the wings heavily powdered with grey, taken on the same ground, for comparison.

Mr S. G. CASTLE RUSSELL—A series of *Argynnis euphrosyne* L. taken by exhibitor in West Surrey, May-June 1946, including two specimens with cream ground colouring, rayed upper and underside forms, and two melanic examples heavily clouded with black. *Maniola jurtina* L., an example showing signs of homoeosis. *Polyommatus icarus* Rott., a rare fawn-coloured female, second brood, taken by Mr E. E. Johnson at Royston, Herts., August 1946. *Aglaia urticae* L., a cream-white form taken by Mr A. W. Richards, M.A., B.Sc., at Aldershot, Hants., August 1942.

Mr P. SIVITER SMITH—Ten cases of *Lycæna phlaeus* L. showing the British and Foreign variation of this species, and almost all the known races and subspecies. The first three cases showed British varieties. These, for convenience in sorting and analysing, were grouped under Leeds' system of names. The variation in ground colours, from white through cream and golden to fiery red, formed a remarkably graduated series. Very narrow or very wide borders were shown, also the gradual suffusion of the forewings, which even in England can be quite considerable and there were two examples of an extreme black suffusion and an extreme brown suffusion—the characteristics being quite different.

There were examples of various pathological varieties of one type or another, some of considerable interest. There were also two rather similar forms of the rare homoeosis, having copper and black marking on the underside of the hindwings. One of the very few known gynandromorphs (left side female, right side male) was also exhibited in the series. The remainder showed practically all the various intricate spot variations that can occur, many of the forms being common but several being very rarely found. There was an extreme underside streaked (forewing) variety and one transitional to it. Various underside forms were shown.

Two drawers showed mixed series from various British and Irish localities. These varied considerably among themselves but on a superficial examination it was possible to see that Kentish specimens are not (as supposed) consistently larger than those from other areas, and that Cornish, Isle of Purbeck and even Cannock Chase examples were as large or larger. Males from Yorkshire seemed rather on the small side but Lincolnshire specimens were of fair size throughout. Irish forms were large, also Scotch females, but the single Scilly Isles specimen was not notable. Southern areas, as expected, showed more signs of darkening in summer broods.

Some of the North American subspecies were shown and these could be seen to have very close similarity to specimens from Siberia and the Far East. Specimens from Europe (N.) and European Russia were of fair size and uniformly rather dull. Swiss examples varied a good deal in brightness—the effect of different altitudes with consequent temperature ranges.

As soon as the Mediterranean countries are reached, a change takes place and the specimens were (except early broods) either slightly or very greatly suffused with brown or brownish-black, all gradations existing. Round the Mediterranean, the specimens were not only more suffused but it could be seen that they took on a "stouter build," particularly in respect of the forewings (in this being somewhat similar to Indian specimens). Portuguese specimens were seen to be larger than Spanish ones; Central and South Italian specimens were very dark indeed and among these was a small race. There were many interesting varieties, including a transition to the very rare white hindwing underside.

Specimens from Jugo-Slavia were of good size and Greek forms showed a wide difference between non-suffused forms and the most suffused of all—several having no copper at all. Specimens from Thrace were clear but from Istanbul were much suffused again. The whole series showed that, almost without exception, specimens from areas bordering the Mediterranean have rather a recognisable facies; the suffusion seems to be a different type from that in other areas, and they have that “stouter build”—both qualities are very hard to define but could be observed in the long series shown.

N. African specimens were not remarkable and from Madeira came the usual subspecies found there.

The specimens from Asia Minor began to show the links with the Far Eastern forms, large size, slightly stronger red band beneath on hindwings, and a yellowish tinge beneath. One from S. Central Russia is exaggerated in this respect, being a subspecies on its own. The Indian races take this on in greater degree, were very large, and while some areas did not give much suffusion owing to altitude, others gave a very intense blackness with a similar stoutness of build as in the case of Mediterranean specimens; the forewings, however, were a little more pointed than in the latter forms. On the underside of the hindwings, we saw the start of the Far Eastern characteristics, more prominent spots and red band.

Thibet is isolated and has a characteristic subspecies, the main feature being a lemon-yellow tinge on the whole of the underside, but it is clearly linked to the Indian forms. A long series from Thibet was to be shown but unfortunately only four of these interesting specimens could be prepared in time.

From Siberia there were examples of the subspecies that inhabits North America (it is also curiously found in N. Scandinavia). It is linked to the Chinese and Japanese forms by the race found in the Tian-Shan Mountains. The series of several thousand specimens showed how these various races were located and linked by transitions one with another, and showed the extremely difficult problem that is to be solved in the directions of tracing their origins and lines of distribution.

Typed notes gave the salient points in each case and also maps were shown. These gave the distribution of the main races of *L. phlaeas*, and a novelty was a map showing the Barriers to Distribution that would face this (and most) species. These Barriers comprise seas, mountains, deserts, forest and prevailing wind. Examination of this map showed that the main races fell into their expected positions as shown by the isolating factors. Another map showed part of Wegener's Hypothesis—the Movement of Continents—important as a consideration in the case of movement of insects between Europe, N. America and Asia. A further map showing the approximate extent and effects of Ice Ages was also exhibited as this had much effect on insect movement. From these maps and data a tentative course was plotted as to the route that might have been taken by the red-banded (underside) form of *L. phlaeas*.

in its travel from the Far East to N. Scandinavia, to N. America, or alternatively in precisely the other direction. Further data and work will no doubt modify and extend these suggestions.

Mr B. B. SNELL—Lepidoptera taken or bred, end of 1945 and 1946: *Gonepteryx rhamni* L. and *Polygonia c-album* L. from Delamere, both rare in Cheshire; *Lymantria monacha* L., Suffolk, third generation; *Lasioampa trifolii* Schiff., Formby, Lancashire; *Diacrisia sannio* L., Delamere; *Macroglossum stellatarum* L., Cheshire, bred; *Lampra fimbriata* Schreb. (= *fimbria* L.), Delamere, bred; *Cerapteryx graminis* L. and *Apamea furva* Schiff., North Wales; *Polia nebulosa* Hufn. var. *robsoni* Collins and *Melanchria persicariae* L., Delamere; *Stilbia anomala* Haw., N. Wales; *Amphipyra pyramidea* L., Cheshire; *Anchoscelis helvola* L. and *Lithomoia solidaginis* Hb., N. Wales; *Nonagria typhae* Thnbg., a bred series, and *Mormo maura* L., Cheshire; *Petilampa minima* Haw. (*arcuosa* Haw.), Delamere; *Sphecia bembeciformis* Hb., Whixall, Shropshire; *Plusia festucae* L. and *Zygaena trifolii* Esp., Cheshire; *Bomolocha fontis* Thnbg. and *Sterrhia inornata* Haw., Delamere; *S. aversata* L. and a bred series of *Ecliptopera silaceata* Schiff., Cheshire; *Lygris testata* L. and strongly banded *Oporinia filigrammaria* H.S., series from N. Wales; bred series of *Eupithecia linariata* Schiff. from Cheshire and *Chloroclystis debiliata* Hb. from Shropshire: *Eumithecia innotata* Hufn., Newquay, Cornwall; *Abraxas sylvata* Scop., Delamere; *Gnophos obscurata* Schiff., grey form, Cheshire; *Semiothisa liturata* Ckck. with ab. *nigrofulvata* Collins, Delamere; *Erannis auran-tiaria* Esp. with ab. *fumipennaria* Hellwg., a series including heavily banded and suffused males from Bromborough, Cheshire, the first record of this ab. for the county; *Cleora repandata* L. with ab. *nigricata* Fuchs, Cheshire; *Selenia bilunaria* Esp., Suffolk, a bred series showing dark ♂ undersides; *Ectropis crepuscularia* Hb. ab. *delamerensis* B. White, Delamere; the following from Cheshire: *Achroia (Meliphora) grisella* F., *Crambus perlellus* Scop. (*warringtonellus* Staint.), *Phlyctaenia crocealis* Hb., *Phalonia affinitana* Dougl., *P. griseana* Steph. (= *vectisana* Westw.), *Coleophora tripoliella* Hodg., *Ernarmonia galli-cana* Guen. (= *rufillana* Westw.), all uncommon in the county; a bred series of *Tortrix postvittana* Walk. from Newquay, Cornwall

Mr W. H. SPREADBURY—Lantern slides of British Fungi from Ash-tead, Mickleham and Oxshott, Surrey:—*Geaster triplex* Jungh.; *Sparassis crispa* Fr.; *Hydnum repandum* L.; *Phlebia merismoides* Fr.; *Ithyphallus impudicus* Pers.; *Mutinus caninus* Fr.; *Calocera viscosa* Fr.; *Clavaria argillacea* Pers.; *Polyporus annosus* Fr.; *Polystictus perennis* Fr.

Mr G. STOUGHTON-HARRIS—*Nymphalis polychloros* L.—3 specimens, 2 male and 1 female, Isle of Wight, August 1946. *Argynnis aglaia* L.—1 female with dark purplish marking, Brading, Isle of Wight, August 1946. *Melitaea cinxia* L.—4 specimens, Ventnor, Isle of Wight, 2nd June 1946. *M. athalia* Rott.—14 specimens from Blean, Kent, taken on 30th June 1946, including one near var. *navarina* Selys-Long. *Lysan-*

dra coridon Poda—A series from Isle of Wight, August 1946—34 specimens—9 male and 25 female showing particularly underside variation in background and spotting. Several female *obsoleta* Tutt.

Mr J. TETLEY—Aberrations of *Argynnis selene* Schiff. taken in a small area in Sussex, 1944-5, comprising: (a) 1944, nine male examples with central markings of forewings obsolete or much reduced and rayed borders, black suffusion of hindwings in varying degree with borders rayed or streaked in such variety that no two specimens are alike, and with the underside of the hindwings in every case pearly white with rayed margins; (b) 1945, four examples, three males and one female, with the uppersides almost wholly of a rich velvety black-brown, the undersides being very dark and having the median row of spots on the hindwings a bright blue instead of silver; four examples, including one female, of the type form taken in 1944; and two females, one cream-coloured and one light straw-coloured.

Mr HY. J. TURNER (per Mr M. Niblett)—A series of *Polyommatus* (*Lysandra*) *aragonensis* Grhd. ssp. *bolivari* Romei, from Montarco near Madrid, Spain, taken at the same time and place as the type specimens and hence called "Cotypes." This species is closely related to our *Lysandra coridon* Poda. Also two species of *Papilio* (Swallow-tail), *Papilio eurosia* Leech and *P. parus* Nue, said to be cotypes also, from West China.

Mr S. WAKELY—255 species of lepidoptera taken during the current season, including the following:—*Mitochrista miniata* Forster, Alice Holt Forest, Hants.; *Trichiura crataegi* L., Canvey Island, Essex, bred from larvae; *Gortyna flavago* Schiff., Plaistow, London, E.; *Hadena genistae* Bkh., Herne Hill, London; *Sterrhia muricata* Hufn., Parley Heath, Dorset; *Eupithecia virgaureata* Doubl., bred from Cornish larvae; *Horisme vitalbata* Schiff., bred, Storrington, Sussex; *Brephos notha* Hb., bred, Epsom, Surrey; *Boarmia roboraria* Schiff., Alice Holt Forest, Hants.; *Selenia tetralunaria* Hufn., including a melanic specimen, bred, Coulsdon, Surrey; *Tethea* or Schiff. and *Polyploca ridens* F., bred, Warnham, Sussex; *Aegeria andrenaeformis* Lasp., bred, Selsdon, Surrey; *Homoeosoma cretacella* Rössl., bred, Gurnard, I.W.; *H. saxicola* Vaugh., Herne Hill, London; *Crambus contaminellus* Hb., Plaistow, E. London; *Acentropus niveus* Ol., Clapham, London; *Platyptilia punctidactyla* Haw. and *P. acanthodactyla* Hb., bred, Ranmore, Surrey; *Oidoematophorus osteodactylus* Zell., bred, Darenth Wood, Kent; *Alucita spilodactyla* Curt., bred, Compton, I.W.; *Proutia betulina* Zell., bred, Epping Forest; *Phalonia curvistrigana* Wilk. and *Eucosma latiorana* Herr.-Schäff., bred, Darenth Wood, Kent; *Eucosma demarniana* Fisch. v. Rössl., Broadwater Forest, Sussex; *Argyroploce pomedazana* Pierce & Metc., bred, Duford, Surrey; *Pammonene fasciana* L. (*juliana* Steph.), Herne Hill, London; *Ernarmonia internana* Guen., Wimbledon Common, Surrey; *Depressaria angelicella* Hb., bred, Duford, Surrey; *Ethmia decemguttella* Hb., bred, Hod Hill, Dorset; *Gelechia pinguinella* Treits., Bexley, Kent; *Gelechia rhombella* Schiff.,

Herne Hill, London; *Gelechia suppeliiella* Wals., Dartford Heath, Kent; *Anybia epilobiella* Roemer, bred, Effingham, Surrey; *Mompha locupletella* Schiff (*schrunkella* Hb.), bred, Freshwater, I.W.; *Mompha stephensi* Staint., Bexley, Kent, and Ashtead, Surrey; *Blastobasis lignea* Wals., Herne Hill, London; *Schiffermuelleria augustella* Hb., Ashtead, Surrey; *Elachista megerella* Hb., bred, Bexley, Kent; *Metriotes modestella* Dup., Three Bridges, Sussex; *Coleophora fuscocuprella* Herr.-Schäff., bred, Darenth Wood, Kent; *Coleophora erigerella* Ford, bred, Bexley, Kent; *Lithocolletis ulicicolella* Staint., Dartford Heath, Kent; *Lithocolletis quinqueguttella* Staint., bred, Parley Heath, Dorset; *Parectopa ononidis* Zell., bred, Coulsdon, Surrey; *Gracillaria azaleella* Brants, bred, Bournemouth, Hants.; *Leucoptera lathyriifoliella* Staint., bred, Shanklin, I.W.; *Tinaea piercella* Bentineck, bred, Norwood, London; *Ochsenheimeria vacculella* Fisch. v. Rössl., Redhill, Surrey; *Nemophora cupriacella* Hb., Warnham, Sussex; *Heliozela resplendella* Staint., bred, Bexley, Kent; *Micropteryx aureatella* Scop., Durfold, Surrey; *Stigmella septembrella* Staint., bred from leaves of *Hypericum androsaemum* L., Shanklin, I.W.

Dr J. A. WALKER—*Dasychira fascelina* L.; bred from larva taken when nearly full grown, Parkstone, Dorset. On heather. Ground colour pale and the orange lines irregular: *D. pudibunda* L., melanic and unicolorous examples from Poole, Dorset. *Amathes c-nigrum* L., albino specimen, rather small. One of several at sugar, Wicken Fen, 21.8.46. *Argynnis euphrosyne* L., with the ground colour almost white, taken in Denny Wood, New Forest, 29th May 1945. *Lymantria monacha* L. var. *eremita* Ochs., at light, Bratley Wood, New Forest. Most specimens there this year had more or less blackish suffusion like the other exhibited. *Heliothis dipsacea* L., a very pale specimen, taken at Freckenham as late as 23rd August 1946. *Eustrotia olivana* Schiff (= *Banksia argentula* Hb.), taken 18th August 1946 at Wicken Fen, Cambs.

Mr HARRY WEBB—*Maniola jurtina* L. (3 specimens), bleached forms, ♂ Surrey, ♂ Herts., ♀ Surrey. *Melanargia galathea* L. (2 specimens), ♂ Cornwall, has linear marking across discoidal cells. Very unusual. ♀ only data "S. L. Mosely 1896." Has diffused forewings. The hindwing markings are obsolete on the underside. *Melitaea cinxia* L. (2 specimens), ♂ Niton, I. of W., bred ex wild larva. Varied forewing marking. Hindwings with the central bands obsolete on the underside. A typical form shown for comparison. *Aglais urticae* L. (3 specimens), showing very marked distinction in forms. Kincardineshire, Wiltshire, and Isle of Wight. *Polyommatus icarus* Rott. (3 specimens), one ♂ var. *icarinus* Scharff and two distinct ♀ forms; County Mayo. *Lysandra coridon* Poda (11 specimens), 1 *ultra-punctata-caeruleo* B. & L., ♂, East Sussex; 2 ab. *syngrapha* Kef., one with discal spot on all wings, the other on forewings only, Bucks.; 1 ab. *lavandula-minor* B. & L., ♂, Bucks.; 1 *pallidula-obsoleta* B. & L., ♂, underside, Royston; 6 showing very marked variation of undersides,

♀, Royston. *Arctia caja* L. (2 specimens), ♀ bred ex wild larva, Hendon. Typical markings, but *all red replaced by YELLOW*; first generation. ♂ bred ex wild larva, Hendon. Forewings chocolate, hindwings "orange" with fewer spots than usual. *Abraxas grossulariata* L. (2 specimens), ♂ ab. *aberdoniensis* Rayn. Forewings heavy black with slight yellowish marking in basal area and outer margins. Hindwings creamy, with heavy black spots on outer margins; Aberdeen. ♂ ab. *aberdoniensis* Rayn. Forewings smoky black, with darker radiations. Hindwings dingy white, and heavily black spotted; Aberdeen.

Mr H. O. WELLS—Three varieties of *Lysandra coridon* Poda: (1) a male with very large black markings; (2) a male var. *obsoleta* Tutt, and (3) a gynandrous specimen, mainly female. Two extreme varieties of *Polygonia c-album* L. taken in the Wye Valley, one in July 1919 and the other in 1936.

Mr G. J. WOOD—A bred series of *Panaxia dominula* L. showing the result of selective breeding. Also specimens of a dwarf form, bred from Salisbury stock, showing all the markings suffused with yellow. A series of *Arctia caja* L. bred from a single pairing obtained two generations after the original stock was procured, showing extreme variation in colouration, including two specimens with cloudy yellow hindwings. A bred series of hybrids, *Smerinthus ocellatus* L. × *Laothoe populi* L., emerged September 1946.

Mr H. C. WOOLLETT—*Pieris napi* L. var. *hibernica* Schmidt (= *citronnea* Froh.), a series including an extreme form from Donegal. *Colias croceus* Fourc., a bred series which emerged in the winter. A rare underside variety of *Lysandra coridon* Poda.

Mr N. G. WYKES—Rhopalocera taken or bred in 1946: *Pieris napi* L., a series bred from ova laid by ♀♀ taken in Berwickshire on the banks of the R. Tweed; *Apatura iris* L., 7 ♂♂ and 3 ♀♀ bred from larvae found in Oxfordshire; *Aphantophus hyperantus* L., a series from one clearing in a wood near Folkestone, Kent, showing ab. *arete* Mill. and allied forms; *Polyommatus argus* Haw., a series of var. *cretaceus* Tutt taken near Folkestone; *Lysandra coridon* Poda, a long series taken in Hertfordshire and Kent, showing many minor aberrations; *Polyommatus icarus* Rott., a long series taken in one field in S. Bucks., showing minor aberrations.

13th NOVEMBER 1946.

The PRESIDENT in the Chair.

Mr P. W. E. Currie, M.C., F.R.E.S., was declared elected a member.

It was announced that Mr S. N. A. Jacobs had presented a copy of *Catalogue des Lépidoptères de France et de Belgique*, by Léon Lhomme, to the Society.

EXHIBITS.

Mr S. N. A. JACOBS—Mines of *Nepticula haraldi* Soffner, in leaves of the Holm Oak (*Quercus ilex* L.) from Angoulême, France, a new species described in 1942, *Mitt. dtsh. ent. Ges.*, 11 (5/6): 56-61.

Mr F. J. COULSON, on behalf of Mr L. T. Ford—Four specimens of *Nepticula decentella* H.-S., six of *Coleophora erigerella* Ford, and four of *Elachista holdenella* Staint., all of which were being presented to the Society.

Mr C. N. HAWKINS—(1) *Rhizedra lutosa* Hbn., two female specimens taken in October 1945 and 1946 respectively; he drew attention to the unusual amount of black scaling on the wings and body of one of them. (2) *Nonagria sparganii* Esp., male and female, October 1946. (3) *Gortyna flavago* Esp. (*ochracea* Hbn.), a large and very richly coloured female, October 1946. All were from Freshwater, I.W.

Mr R. F. HAYNES—Fruiting sprays of the Strawberry Tree (*Arbutus unedo* L.) from Killarney, Eire.

Mr J. O. T. HOWARD—A tortoise beetle and a Lampyrid larva collected while serving in Ceylon.

Mr F. D. BUCK—The following Coleoptera: (1) *Aphodius conspurcatus* L., taken in fair numbers in horse dung in Epping Forest, 3.xi.46, in company with two or three of the commoner species of *Aphodius*. (2) *Rhyncolus lignarius* Mm., found in the rotten wood of an ash trunk in Epping Forest, 20.x.46. By far the greater number of specimens were dead; presumably the colony was either dying out or was moving into the harder and more inaccessible wood. (3) *Corynetes coeruleus* Deg. was also in evidence with *R. lignarius* Mm. but not in great numbers. The species is usually associated with *Xestobium rufo-villosum* Deg., though probably a predator on many of the smaller species of lignicolous coleoptera. (4) *Micromalus flavicornis* Hb. was also taken in Epping Forest, 3.xi.46, in rotten wood.

27th NOVEMBER 1946.

The PRESIDENT in the Chair.

Mr B. Boyce, Col. V. R. Burkhardt late R.A., Lt.-Col. Chas. C. Champion, Mrs P. L. W. Field, Mr F. Hewson, F.R.E.S., Mr M. Chalmers Hunt, Mr E. P. Jay, Mr F. H. Latham, Mr L. R. H. Newell, Mr Chas. C. Phelps, F.R.E.S., Mr R. Procter, Major-General A. L. Ransome, C.B., D.S.O., M.C., Mr H. Ray, Mr B. H. B. Robinson, Air Marshal Sir Robert H. M. Saundby, K.B.E., C.B., M.C., D.F.C., A.F.C., and Mr E. H. Wild were declared elected members.

The Secretary announced the names of Special Life Members as from the 1st January 1947:—B. W. Adkin who joined the Society in 1886; W. Mansbridge in 1889; H. Moore in 1889; C. J. Wainwright in 1889; A. H. Hamm in 1891; and H. Main in 1892.

Two of the Honorary Members have belonged to the Society for over fifty years, H. J. Turner having joined in 1887 and Major Fremlin in 1886.

The Secretary also read the names of the members recommended by the Council to fill the various offices or to be Ordinary Members of Council for 1947-8.

EXHIBITS.

Mr E. W. CLASSEY, on behalf of Mr G. H. Haggett—A variety of the male of *Spilosoma lubricipeda* L. (*menthastri* Esp.) resembling *edelsteni* Tams, but with a heavier black border broken up by white veins; hindwings with black fringes and heavy spotting; thorax brown; taken at light in West Sussex, June 1946 (ab. *haggetti* Classey—see *Entom.*, 80: 146).

Mr J. O. T. HOWARD—A series of *Lobophora halterata* Hufn. taken near Bristol by Mr E. Barton White, and a series of *Episema caeruleocephala* L. bred from larvae collected in June 1946 near Ramsey, Hunts. He read the following note: "Tutt dismisses this species in some 15 lines. He speaks of 'the endless variation exhibited by the stigmata,' but the only colour variety he mentions is var. *armena* Stgr., of which he says, 'I know nothing of it.' It is described as an Armenian form, 'pallidor, al. ant. cinereis.' Five of my females perhaps approach this form. Turner, in his supplement to Tutt, mentions only dark forms."

Mr S. N. A. JACOBS—*Allophytes oxyacanthae* L. showing a strong melanic tendency, taken at Bromley, Kent, at light on 30th October 1946.

Mr T. R. EAGLES—(1) Sprays of the shrub *Spiraea Vanhouttei* Zabel, on which the larva of *Sphinx ligustri* L. had been found by Commander L. Hollebhone, R.N., at East Sheen, Surrey, on 19th October 1946. (2) Sprays of *Spiraea salicifolia* L. mentioned as a food plant by J. W. Tutt (1904, *Nat. Hist. Brit. Lep.*, 4: 322).

Mr C. N. HAWKINS said he understood *Daphnis nerii* L. had recently been taken in one of the London streets.

Mr E. W. CLASSEY said that Mr G. H. Haggett had taken *Arctornis l-nigrum* Mueller (*Leucoma v-nigrum* F.) (Lep. Lymantriidae) at light, on 6th July 1946, in West Sussex. The specimen has been presented to the Brit. Mus. (Nat. Hist.) at S. Kensington.

Mr A. M. MORLEY then read a paper on "The Lepidoptera of Folkestone" (see *Trans.*).

11th DECEMBER 1946.

The PRESIDENT in the Chair.

Mr R. Coman was declared elected a member.

The following gifts were announced:—

(a) By the Royal Entomological Society of London, a large number of parts of that Society's *Proceedings and Transactions*. This gift rendered complete our run from 1898.

(b) By Mr E. A. J. Duffy, a separate of his paper dealing with the life-history of *Prionus coriarius* L. (Col. Cerambycidae).

EXHIBITS.

Mr L. T. FORD—Short series of about twenty species of micro-lepidoptera not represented in the Society's collection. He was presenting these to the Society.

Mr M. NIBLETT—*Aulacidea subterminalis* Niblett (Hym. Cynipidae), a new species recently bred and named by him. The insect causes a gall, which he also exhibited, on the runners of a species of *Hieracium*.

BARON DE WORMS—A specimen of *Chloroclysta niata* Hb., taken in Sussex in November and which had already hibernated for a month. Only the female of this species does the complete hibernation and lays its eggs in April and May. The example shown had a very marked white band on the forewings, which is somewhat unusual.

Dr G. V. BULL—A specimen of *Arctia villica* L., with the cream spots replaced by white, from Kent.

The PRESIDENT—A variety of *Cerapteryx graminis* L. taken in Dumbartonshire in September last. The ground colour was brownish red, with all the markings obsolete except for the stigmata, which were a pale fawn, and the characteristic white mark on the central nervure, below the reniform stigma. He also showed a very green form of *Cryphia muralis* Forst. taken at Eastbourne, with another specimen from Eastbourne for comparison, together with green examples from Plymouth. It is believed that such very green examples are unusual on the south coast, where the tendency is towards forms of some shade of fawn.

Mr A. A. W. BUCKSTONE—*Plebejus argus* L. and *Polygonia c-album* L., on which he read the following note:

"1. *Plebejus argus* (*aegon*), captured 9th July 1941. A specimen representative of a small colony occurring on the chalk at Horsley, Surrey. The individuals of this colony do not conform to the chalk race but resemble the race found on sandy soil, i.e., being of the darker shade of blue. The forewings are slightly narrower than any found on either chalk or sand. My attention was first called to this colony by my friend, Mr George Strickland.

"2. *Polygonia c-album*. A series bred August 1933 from Ashted ova laid by three butterflies of the summer brood. About 500 imagines emerged, the majority being of the autumn (typical) form but the first few dozen to appear were, as regards the upper side, ab. *hutchinsoni* (summer form). The undersides, however, do not conform to *hutchinsoni* but may perhaps be described as intermediate between that form and the type (autumn brood). Considering the very high temperatures experienced during July and early August 1933, a much larger percentage of the summer form was expected."

He gave the following particulars relating to the breeding of these specimens:—1933—2nd July—Butterflies commenced to oviposit. 8th July—Larvae commenced to hatch. 29th July—Larvae commenced to spin up. 30th July—Larvae commenced to pupate. 7th August—Butterflies emerging (8 days in pupa). 10th August—Last of the larvae

spun up. 12th August—Last of the larvae pupated. 26th August—Last butterfly emerged.

Mr T. R. EAGLES—Specimens of shrubs from South Devon, including *Griselinia littoralis* Forst. and *Pittosporum undulatum* Vent.

Mr E. J. BUNNETT, M.A., read a paper, illustrated by lantern slides, on "The Egg-raft and larva of *Culex*" (see *Trans.*). In the course of the discussion Mr E. W. Classey referred to the fact that the larva of *Culex apicalis* Adams has five pairs of syphonal tufts whereas other British species of *Culex* have four only.

8th JANUARY 1947.

The PRESIDENT in the Chair.

The deaths of Mr F. W. Frohawk and Mr A. G. Peyton were announced.

The following gifts were received for the Society's library:—(1) From Lt.-Col. F. A. Labouchere, a number of parts of the *Proceedings and Transactions of the Royal Entomological Society of London*. (2) From Mr Hugh Main, *The Arachnida*, by F. H. Savory, and five volumes of the *Histoire Naturelle de la France*.

EXHIBITS.

BARON DE WORMS—(1) *Pieris napi* L., spring brood, a series of four males and twelve females intended to show the marked difference, especially in the female, of the Scottish race compared with that found in Southern England. In the Scottish form the females exhibited were distinctly "smoky" and those obtained at Fort William, Inverness, were appreciably darker and had a more pronounced "smoky" appearance than those taken at Aviemore, Inverness. The undersides also were darker than in the Southern spring brood. (2) *Anarta cordigera* Thunb., a series of twelve taken mostly at rest on rocks and fences at Aviemore during the first ten days of May. Several examples with pale grey ground colour to the forewings were included, a form apparently not fully described in the literature and differing appreciably from the race found in the Rannoch, Perthshire, region, where the usual form has very dark forewings. This insect is said to fly at great speed over heathland during the afternoon prior to mating, which usually takes place on rocks on which pairs may be detected. (3) *Anarta melanopa* Thunb., a series of sixteen obtained on high ground near Aviemore at an elevation of 2000 ft. Most of them were secured during sunny periods on 9th May at the blooms of Bearberry (*Actostaphylos uva-ursi* L.). One specimen shown was bred from a pupa found under moss. The species exhibits marked variability in the pattern and degree of darkness on the forewings. (4) *Isturgia carbonaria* Clrck., a short series taken on high rocky heathland near Aviemore. The form in this area is perceptibly larger and brighter than that found near Rannoch. This is not an easy insect to catch and only flies in brilliant sunshine. (5)

Cleora cinctaria Schiff., a series of five males and fifteen females taken at Struan, Perthshire, during May 1946. The northern race differs very markedly from that associated with the heaths of Hampshire and Surrey both in size and in the silvery ground colour. A distinctly banded form is fairly prevalent. In its haunts the insect sits on rocks from which it is readily disturbed.

Mr E. W. CLASSEY—Preserved larvae of some thirty species of Macrolepidoptera presented to the Society by Mr R. L. E. Ford and himself.

Mr F. D. BUCK—The beetle *Sphodrus leucophthalmus* L. taken at Highgate, Middlesex, 28.12.46, in a situation where *Blaps mucronata* Lat., on which it is supposed to feed, occurs plentifully. Also *Hystri-chopsylla talpae* Curv., a species of flea notable for its large size, taken from the nest of a mole in Epping Forest.

Mr R. W. PARFITT—Three specimens of *Eulia formosana* Geyer., taken at light in N.W. Surrey in 1945 and 1946. This species of Tortrix has not been previously recorded in Britain.

Mr F. J. COULSON, on behalf of Mr S. Wakely—Two specimens of *Euophryum confine* Broun. (Col. Curculionidae) for presentation to the Society. This is a New Zealand species which is now spreading in England. The specimens were taken in a log at Herne Hill, London, S.E., on 10th November 1946.

Mr C. N. HAWKINS—The following Water Beetles captured on Wimbledon Common:—*Dytiscus marginalis* L., 19.iv.1946; *Hydaticus seminiger* Deg., 9.v.1946; *Coelambus impressopunctatus* Schall., 31.iii.1904 and 30.iv.1946; *Acilius sulcatus* L., 30.iv.1946; *Hydrobius fuscipes* L., 20.iv.1946; *Laccobius atrocephalus* Reitt. (*ytensis* Sharp), 19.vii.1945; *L. alutaceus* Thoms., 19.vii.1945.

Mr E. H. WILD—*Urocerus gigas* L. (Hym. Siricidae) and its parasite *Rhyssa persuasoria* L. (Hym. Ichneumonidae), from the Quantock Hills, Somerset. He was presenting the insect to the Society.

The PRESIDENT—A specimen of *Hemistola immaculata* Thbg., a male variety taken at Bishops Waltham, Hants., with the transverse white lines on the forewings moved together and almost touching in the centre, an unusual occurrence in a normally constant species. He also showed normal specimens for comparison.

Mr T. R. EAGLES—The lichen *Peltigera horizontalis* Hoffm. from South Devon. He drew attention to the red fruiting bodies (apothecia) adnate to the fronds.

Films were then shown by Mr DE MORNAY, "The Life History of *Papilio machaon* L." and by Mr EZRA DEARING, "An Introduction to the Study of Light." The exhibitors explained the method of preparation of such films and drew attention to the convenient size of the projector and the extreme compactness of the film.

Lantern slides were shown by Miss W. M. A. BROOKE, A.L.S., Mr W. J. SPREADBURY, and Mr E. J. BUNNETT, M.A.

22nd JANUARY 1947.
75th ANNUAL MEETING.

(With which was combined the Ordinary Meeting.)

Captain R. A. JACKSON, R.N., President, in the Chair.

Reports of the Council and Treasurer were read and adopted. A hearty vote of thanks to the generous donors to the funds during 1946 was proposed from the Chair, and carried with acclamation.

The following members were declared elected as Honorary Officers and Council for the ensuing twelve months:—*President*—L. T. Ford, B.A. *Vice-Presidents*—Capt. R. A. Jackson, R.N., F.R.E.S.; Sir Leonard Wakely, K.C.I.E., C.B. *Treasurer*—J. L. Henderson. *Secretary*—F. Stanley-Smith, F.R.E.S. *Editor*—T. R. Eagles. *Curator*—F. J. Coulson. *Librarian*—E. E. Syms, F.R.E.S. *Lanternist*—Vacant. *Ordinary Members of Council*—V. E. August, F.R.H.S.; F. D. Buck; Col. P. A. Cardew; E. W. Classey, F.R.E.S.; C. N. Hawkins, F.R.E.S.; J. O. T. Howard, M.A.; T. G. Howarth, B.E.M., F.R.E.S.; Stanley N. A. Jacobs; Lt.-Col. F. A. Labouchere, F.R.E.S.; H. R. Last.

The following were declared elected members:—Mrs D. M. Williams, Messrs E. P. Williams, G. M. Haggett, W. F. Busbridge, and C. G. Pinn.

Exhibit by Mr E. H. WILD—Stems of the Cow Parsnip, *Heracleum sphondylium* L., showing the method of pupation and emergence of *Depressaria heracleana* L.

The PRESIDENT then read his address.

PRESIDENT'S ADDRESS.

Ladies and Gentlemen: We have come to the end of another year and can claim that our Society continues to make most satisfactory and steady progress.

The reports of the Council and the Treasurer, which you have just heard, give you an account of the activities of the past year and of our financial position, which is satisfactory.

At the end of last year you paid me the very high compliment of electing me to the office of your President for the second year in succession—a mark of your confidence which gave me the very greatest pleasure.

Now that the time has come for me to lay down the burden—and I will not conceal the fact that your President does have to bear a considerable burden—it will be useful, I think, to review the present position in the light of the many changes which have been forced upon us during the last two years.

Before I come to that, however, and although I shall deal with the matter again later, I must say now how deeply I am indebted to the honorary officers and to the Council for their hard work and loyal support. We have worked together happily as a team, and without that spirit we could not have made the progress we have—and progress we have made.

Two years ago we were established at the Chapter House in the neighbourhood of London Bridge, with a membership of 280; to-day we are able to hold our meetings in the very heart of London—I might say of the world itself—and our membership has increased to 385, although this is less than the figure which I said I looked for by the end of this year.

Our move west was naturally a cause of great anxiety and even of some misgiving, but I think that this increase in our membership is sufficient indication that your Council was wise in its decision.

Last year we were greatly handicapped by the fact that our Library and Collections were not accessible, but this has now been put right, and, thanks to the officers of the Royal Society, we are able to share accommodation with the members of the Queckett Microscopical Society in this building. We do owe a very great debt of gratitude to the President and officers of the Royal Society for their kindness, and I can never be sufficiently grateful to the Assistant Secretary, Mr Griffith Davies, for all his help to me personally on behalf of our Society.

I want, now, to say a word or two about our meetings, for, as I said last year, we must guard against them becoming too formal. I should like to see more exhibits at each meeting, and, above all, to hear more discussions of the exhibits themselves. At present, I feel that not enough members take part in these discussions, which is a great pity, for so often a chance word or phrase may open the way for a much wider and profitable debate. The exhibition of even common insects, particularly in the early stages, often brings facts to light hitherto obscure or overlooked, and no one should be diffident in expressing his views, asking questions, or telling of his experiences.

You will have seen that we have a most interesting programme of papers for the winter session—the first-fruits of the Panel we instituted last summer to work with Mr Syms in arranging the indoor meetings; but I hope that next summer we shall continue the system then introduced of arranging for one paper each month and devoting the other fortnightly meeting to exhibits and discussions on field work.

I noticed with great pleasure last year that these meetings seemed popular with our members, and the attendance—even in August—was particularly striking.

There is one problem for which we have not yet been able to find a solution, and that is how to arrange the duties of the Council in order that they may have more opportunities of seeing their friends on meeting days. It is a very difficult question but is not being forgotten.

To turn to the matter of our financial position for a moment, you will have heard with pleasure from the Treasurer's Report that our position is satisfactory. The main anxiety with which we have to contend is, of course, provision for the cost of publication of our *Proceedings*. Printing costs have risen very considerably and the cost of plates, particularly, in colour, is very high, but here again we have to be very grateful to the Royal Society. For the first time in our

history we have received, through them, a Parliamentary Grant in aid of our publications, and are very hopeful that we may be able to look for a similar grant in future years. Hitherto, it has been necessary to restrict very materially the amount of matter we could publish, or to expect authors to bear a proportion of the cost of their papers; this always seemed to me to be most unsatisfactory.

I must not forget, of course, that the Society has much cause for gratitude to certain most kind but anonymous friends who have been very generous in making donations to our Publication and Illustration Funds. Your Council are deeply sensitive of their generosity, but, at the same time, it is far from satisfactory to have to rely upon a source of income which may be withdrawn at any time.

As is only natural, the increase in our membership has come about through a great access of country members, and if one studies the list of addresses it will be seen that they are distributed all over the country. This change in the status of the Society commenced in the year 1888, when at the instance of the late Mr J. T. Carrington, one of our Vice-Presidents and Editor of the *Entomologist*, your Council decided to enlarge the scope of the country membership. This led to an immediate access of new members, total membership standing round about the 250 mark in the early nineties. The result was that the "South London" became, and has remained ever since, one of the leading Entomological societies in the country, and this was emphasised again in the pages of the *Entomologist* by the late Mr R. South, who had succeeded Mr Carrington in the Editorial chair.

If that was the case 50 years ago, it is more than ever the case to-day, and I think I am making no false boast when I claim that your Society to-day is pre-eminent as regards the numbers of active workers in the field included in its ranks.

This brings me to another point which I think it is wise to ventilate if you agree with me that we are no longer just a local Society, and that is whether a change of name is desirable. This was a subject first raised by Mr South in 1890, and I find that in 1891, when the rules were under revision, a change in the name was suggested and promptly rejected at a General Meeting. I believe there has been some talk again recently concerning the desirability of a change, but I want to say now that, for my part, I would be most strongly against any such proposal. We have had recent cases of societies changing their names, amalgamating with other societies, and so on, and I believe that such changes are a sign of weakness. Ever since our foundation we have been known as the "South London," and I believe I am voicing the opinion of most of you here when I say that I hope we shall go on as we began as long as we exist.

Our Exhibition has come to be one of the Entomological events of the year—greater and better than ever now that we can hold it in these fine rooms—and I hope that our Annual Dinner will be as eagerly anticipated.

It is no mean thing, Ladies and Gentlemen, to belong to the "South London," and long may your Society flourish under its old name, even though it has far surpassed the anticipations of its founders.

And now, Ladies and Gentlemen, it is my sad duty, in accordance with our custom, to call to your mind those of our members who have passed away. During the year the Society has had to mourn the loss of four members, two well known to all of us here as constant attendants at our meetings.

Our old friend, Mr Dennis, died at a ripe old age on 17th January 1946, but we did not hear of his decease until after the last Annual Meeting. Joining the Society in the year 1889, he was one of our oldest members, but he was wonderfully fit and very regular in his attendance up to within a few months of his death. In his early days he was a keen and active collector, catholic in his tastes but with a leaning to the lepidoptera and botany. He added to these considerable skill in photography and the use of the microscope, and it was only shortly before his death that he presented his valuable instrument to the Society. You may remember that in addressing you last year I had occasion to refer to the many gifts he had made to the Society. I had a feeling at the time that he felt the end approaching and wished to make over to us his possessions whilst there was still time.

Mrs Maud Stanley-Smith, the well-loved wife of our Honorary Secretary, died very suddenly on 26th June, as the result of an accident, although she had been in poor health for several months. She joined the Society in 1928 and was an ardent lepidopterist and a very regular attendant at our meetings. She served on the Council for several years and we had much cause for gratitude to her for the great part she played in the organisation of the teas for our war-time exhibitions at the Chapter House.

Mr F. W. Frowhawk died on 10th December at the age of 84, and his passing removes almost the last of the great entomologists of the Victorian era. Originally elected to our Society in 1886, he dropped out in 1899 but was re-elected in 1912 and made an Honorary Life Member in 1943. He was elected to a special Life Fellowship of the Royal Entomological Society of London in 1926, having been elected a Fellow in 1891. Mr Frowhawk was a true naturalist, an accomplished artist and a delightful writer, adding to these gifts, perseverance and powers of observation almost unique. His determination of the complete life-history of the Large Blue is sufficient proof of these attributes, and his different works on British Butterflies will be a lasting testimony to his ability. Though gravely stricken in later years, his interest in entomology was maintained, and he was present at our exhibition as lately as the end of last October.

Mr A. G. Peyton, who was elected to the Society in 1933, died on 11th December, in his early fifties, after a long illness. He was a keen collector of lepidoptera and must have been one of the last to see *Aporia crataegi* in its wild state in Thanet, a nice row taken in 1906 being amongst his early captures. A schoolmaster by profession, he

was an indefatigable worker, and was never so happy as when in the fields, often accompanied by his wife.

We mourn the passing of these members, and extend our sympathy to the bereaved.

It could hardly be expected that the year just passed could live up to the standard of 1945 in things entomological, but in some ways it has proved even more noteworthy. The addition of a geometrid moth, a tortricid and a dragon-fly to the British list is indeed remarkable, whilst Mr M. Niblett has been able to breed and describe a gall wasp new to science.

Once again, our member, Dr K. G. Blair, has earned our respect and admiration by the capture of the geometrid moth *Cosymbia pupillaria* (Hb.) in the Isle of Wight. The insect is a female and laid fertile eggs, the larvae of which were feeding up well. It is an interesting speculation as to how this South European species reached the Isle of Wight—whether it was a very recent migrant or has dwelt there and bred for a number of years. The insect in question was shown for the first time at our exhibition in October. Thus, for the second year in succession, Dr Blair, primarily a coleopterist, has added one of the so-called macrolepidoptera to the British list. I am wondering what surprise he will have in store for us next year, for they say these things always go by threes.

In the meantime, I am glad to say that our "micro-men" have not been idle, and to Mr R. W. Parfitt belongs the credit of adding the tortricid moth *Eulia formosana* Hb. to the British list. The larva feeds on *Pinus sylvestris* L. It lives in a silken tubé, open at both ends, more or less along the twig near to the terminal shoots.

Mr E. B. Pinniger has been responsible for the capture of several specimens, both male and female, of the dragon-fly *Coenagrion scitulum* Ramb. in S.E. Essex. It was only fitting that Miss C. Longfield, an acknowledged expert on this group, should have been with him at the time.

Finally, the discovery of the new gall wasp *Aulacidea subterminalis* is described by Mr Niblett in the *Entomologist* for November 1946, and specimens were exhibited at a recent meeting of our Society. The gall is situated on the runner just below the terminal rosette of leaves of *Hieracium vulgare*, and, in Mr Niblett's opinion, was described in 1890, but there is no record of the insect causer having been bred or described. Our congratulations are due to Mr Niblett on his discovery.

Apart from the above additions, there have been several other interesting captures.

Perhaps that of greatest interest is a specimen of *Trigonophora fluminea* Esp. taken in a light trap on the South Devon Coast. It may not be too much to hope that this handsome insect will once again establish itself in this country.

In July, a male specimen of that rare migrant *Arctornis l-nigrum* Mueller (= *Leucoma v-nigrum* Fab.) was taken at light in Sussex, whilst

in October, a specimen of *Plusia orichalcea* Fabricius (= *aurifera* Hübner) was taken on flowers in Co. Cork. I believe this insect has never before occurred in the British Isles.

Several specimens of *Sterrhia sacraria* and two of *Thalera fimbrialis* have also occurred.

As recorded in the report of your Council, the Society is greatly indebted to many kindly donors for their generous gifts. To all of these our thanks are due, but, in particular, I would refer to the presentation by Mr R. L. E. Ford and Mr E. W. Classey of examples of the preserved larvae of nearly all the British macro-lepidoptera and of a considerable number of the "micros." These, when all received, will form a most valuable addition to our reference collection.

I must now pass to the customary second part of this address, always a source of anxiety to your President. Last year I dealt with causes for the fluctuations which occurred in the numbers of lepidoptera and the disappearance of certain species. I thought it might, perhaps, be interesting to-night to consider the steps which have been taken up to the present to prevent the loss of indigenous British species, and what further efforts can be made to the same end. I have chosen as a subject, therefore:—

THE PROTECTION OF BRITISH LEPIDOPTERA.

The protection of the fauna and flora of these islands is a subject dear to the heart of nearly every Englishman. I suppose that one of the earliest trends in this direction is to be found in the game laws dating from very ancient times, even before the enclosure of the land, although it may be said that the ultimate end of these enactments has been to ensure that the land-owner was able to enjoy good sport on his estates.

Be that as it may, close seasons for shooting have been established and hunting is stopped during the breeding season, thus ensuring that both foxes and game birds are able to rear their families in peace and quiet. The wise landlord ensures that a good breeding stock is left each year, and it is only on the smaller syndicate shoots that the land is really "skinned"—as the saying is.

The smaller birds were not so fortunate, and it seemed at one time that our country-side might well go the way of that of France, where small birds of every kind are subject to the most ruthless extermination. However, that was not to be. Protection was afforded in a limited way at first, and now, under the Wild Birds Protection Act, the killing of the adults or the taking of eggs of certain species is entirely forbidden, whilst others receive lesser degrees of protection.

In the same way, the various Fishery Acts provide protection to fish during the spawning season.

Thus, it will be seen that insects are the only group for which it has not been possible to provide some form of legal protection. Indeed, the position is rather worse than this, for we find frequent references in the Entomological Magazines to the diminution in numbers of certain

species due to the increase in insectivorous-feeding birds brought about by the passing of the Acts for their protection. One has but to watch the labour of a pair of tits feeding their young to realise what a toll is taken of insect life, whilst it is well known to us that the neighbourhood of coverts well stocked with pheasants is unlikely to be productive ground.

However, in spite of the steps referred to above in the case of other living creatures, I do not believe that it would be possible to provide protection for lepidoptera by Act of Parliament. The question then arises—Is protection of some sort necessary or desirable and, if so, how is it to be obtained? If the answer to the first question is in the affirmative, it will be necessary, before coming to the second, to consider the causes threatening our native insects. In my address last year I dealt with the danger of over-collecting and it was pointed out that eminent entomologists, including Mr Stainton, were constantly declaring that this or that species would surely be exterminated. I believe the fear in those days was more real and better justified than it is to-day.

In the 60's and 70's of the last century the collecting of insects was a tremendous vogue, and even up to the beginning of this century we find records of enormous takes of individual insects. It is quite common to read that in the 90's one collector took 150 of a particular species. That was in the days when "exchange" was much in vogue—a greedy collector hoped to enrich his own cabinet by the capture of immense numbers of a rare or local insect which he had come across, whilst the more generous were anxious to provide insects for their friends.

I think times have changed; improved means of transport, and, in particular, the motor car, have made it easier for individuals to collect their own insects. "Exchange" is out of fashion, and the numbers of professional collectors are greatly reduced. However, the danger does remain, and I believe it is sound to say that protection is required by certain species.

In dealing with causes leading to the disappearance of such species, I said last year that, whilst over-collecting plays its part, I was sure that altered conditions of habitat or terrain are more important. If that, then, is agreed, protection must take two lines, firstly in attempts to provide for the preservation of suitable natural conditions for particular species in their chosen habitats, and, secondly, the discouragement of indiscriminate collecting.

Having, therefore, formed some idea as to our ultimate objective, let us turn now to a consideration of what steps to this end have been taken in the past, what is being done now, and how—if at all—the present position can be improved.

The first reference I can find to any organised effort is when Mr R. McLachlan, F.R.S., opened a discussion "as to the best means of preventing the extinction of certain British butterflies" at the meeting of the Entomological Society of London on 6th May 1896. He referred to the extinction of *Lycaena dispar*, *Cyaniris semiargus (acis)* and *Aporia*

crataegi, and spoke with regret of the approaching disappearance of *Papilio machaon*, *Melitaea cinxia* and *Maculinea arion*.

The President, Professor Meldola, was in full sympathy with his views, and thought that a resolution passed by the Society, possibly in conjunction with similar societies of like mind, might have some effect.

Considerable discussion followed, when several members pointed out that the disappearance of a species from particular localities was not always due to over-collecting but to other causes. For instance, in the case of *arion*, it had disappeared from localities not open to collectors, and this was attributed to the burning of the grass and the destruction of its food plants.

It was eventually decided to arrange for the appointment of a Committee by the Council, to investigate the question and render a report thereon. The Committee was duly appointed by the Council on 3rd June 1896, under the presidency of Lord Walsingham, and consisted of Professor Meldola and Messrs E. M. Buxton, Goss, McLachlan, Porritt, South, and Tutt, with Mr C. G. Barrett as Secretary.

This Committee then started to investigate the subject, and in January 1897 we find a notice in the *Entomologist* stating that it was resolved to invite the co-operation of local societies throughout the United Kingdom and ask them to furnish information as to proceedings likely to cause the extermination of local species of Lepidoptera.

After further deliberations, the Committee reported that "it was desirable to form an Association, the members of which should agree to discourage, by their own example and by their influence, the excessive collecting of all those species of lepidoptera which from their habits appeared to be in danger of extermination." This was referred to at the meeting of the Entomological Society on 3rd March 1897, and on 7th April a formal "Memorandum of an Association for the Protection of Insects in Danger of Extermination" was laid before the Society, adopted, and signed by those present.

It remained, then, to decide what insects were to be included, and in July 1897 a notice in the *Entomologist* gave a list of 32 species, being "local species in danger of extermination," to be particularly recommended for protection. It was further resolved by the Committee that a copy of this list should be forwarded to every society co-operating with the Committee, but that there was no desire to hamper such societies in any more stringent action proposed by them for the protection of local species. It was also resolved that each such society should be invited to delegate one of its members who would be received as a member of the Committee.

It appears that in 1897 this question of protection was occasioning considerable feeling, for in an article in the *Saturday Review* of 17th July Mr Harold Hodge advocated the severest "sanctions" against omnivorous collectors, including the compilation of a "black list," although at the same time, in *Science Gossip* for August, Mr J. T. Carrington stated his opinion that the disappearance of certain species

could not be laid at the door of indiscriminate collectors. Mr South gave a leading article on the subject in the *Entomologist* for September 1897, stating as his opinion that whilst certain species seem likely to disappear from possibly natural causes, they should not "be worked so closely and persistently as they have been," since this could only hasten their extinction.

The list of 32 species referred to above did not by any means command universal agreement, and the inclusion of such species as *Porthesia chrysorrhea* and *Clisiocampa castrensis* was adversely commented on by our late member, Mr Robert Adkin.

Finally, the work of the Committee was referred to by the President of the Entomological Society in his annual address on 19th January 1898, when he said that the action taken would certainly "not be barren of results." It is a sad commentary, however, that to-day five of the thirty-two species listed by the Committee are no longer to be taken regularly in this country, and it is noteworthy that the labour of the Committee appears to have been directed solely to the protection of insects from over-collecting.

After all this activity in 1896-7, the whole question of protection appears to have been dropped; no more was heard of the Committee; it was never formally dissolved but, like the old soldier, it just faded away.

The next movement towards protection appears to have been the purchase of a small portion of Wicken Fen early in 1899 by Mr J. A. Moberley, and its presentation to the National Trust as a Nature Reserve, and this was followed by an article in *Science Gossip* for March 1899, by Mr Goss, appealing for the co-operation of all naturalists to render assistance to the Trust to secure portions of the Fen when these came into the market. This marked the beginning of what is one of our most interesting Reserves to-day, large portions of the Fen having been presented to the Trust by eminent entomologists—their memory being recorded in the names of the various droves.

Apart from this, little can be found regarding protection until 1916, when the President of the Entomological Society took as the subject for his address the preservation of wild life. Mr Rothschild laid particular stress on the importance of preserving the natural habitats, and emphasised that it was of little use prohibiting the capture of rare insects if changing conditions rendered it impossible for their food plants to survive.

The following years were uneventful, but writing in the *Entomologist* for 1923, Captain N. D. Riley quoted a Police Order recently issued in Prussia, forbidding under the severest penalties the taking or destruction of *Parnassius apollo*, and hinted that perhaps ordinances of a like nature might be required here. This was but the forerunner of the storm to come, for the magazines in 1924, 1925, and 1926 were crowded with angry articles commenting on the bad behaviour of a number of collectors.

The ball was started by a paragraph in a report in the *Entomologist* by our late member, Mr J. Forsyth-Johnstone, who mentioned the great and unnecessary slaughter of *Polyommatus thetis* of which he had been

a witness at Folkestone. This was followed up by an article by the late Mr F. Pennington in the September *Entomologist*, and in an Editorial comment suggestions as to the means of combating the evil were requested, the Editor hinting that satisfactory results were only likely if legislation were to be passed similar to the Wild Birds Protection Act. In a further note the Editor drew attention to, and gave the composition of, the Central Committee for the Protection of Nature, on which the Entomological Society of London was represented by Lord Rothschild and Mr W. G. Sheldon.

During the remainder of the year and in 1925 the storm raged, one instance being quoted of the collection of the larvae of *Melitaea cinxia* in such numbers that it was necessary to collect their food plants by the barrow-full, fuel being added to the flames of wrath by the subsequent advertisement of these larvae and pupae for sale at 10/6 to 22/- per hundred.

Some correspondents took the view that the extermination of species was entirely due to over-collecting; on the other hand, there were to be found some who advanced the view that variety-hunting and heavy collecting killed off the weaker insects and so brought about an increase in stocks—an argument really rather hard to justify.

A most interesting article by Mr J. C. F. (now Sir John) Fryer is to be found in the *Entomologist* for January 1925, in which he came to the conclusion that much wanton destruction had occurred. He advocated the preparation of a short list of those species most in danger, coupled with a scheme whereby the various societies should undertake to discipline the general body of collectors.

This was followed by a vigorous article in May by the late Mr W. G. Sheldon, who concluded by begging collectors to give a rest to *Maculinea arion* on the Cornish coast.

The fruits of all this agitation were to be seen in July 1925 when it was announced that the Council of the Entomological Society of London had agreed to appoint a new Committee for the Protection of British Lepidoptera, at the request of the British Correlating Committee for the Protection of Nature.

Thus, after a period of nearly 30 years, history repeated itself.

The names of the Committee, as announced, were Lord Rothschild and Messrs H. M. Edelsten, J. C. F. Fryer, N. D. Riley, and W. G. Sheldon. The Committee held their first meeting on 25th September 1925, when Lord Rothschild was elected as Chairman with Mr H. M. Edelsten as Secretary.

The following species, threatened with extinction or already extinct, were brought under review:—*Maculinea arion*, *Melitaea athalia*, *Melitaea cinxia*, *Leptidia sinapis*, *Aporia crataegi*, *Lycaena dispar*, and *Cyniris semiargus*.

The Chairman said that he considered that the Committee should endeavour to introduce threatened species into new districts, and also create reserves wherever suitable pieces of land could be secured for this purpose.

The preparation of an authoritative list of species needing protection, and its publication in the journals, was also considered, and it was stated that any further suggestions or observations would be welcomed by the Committee.

It is to be noted that in his article in the *Entomologist* in May 1925, Mr Sheldon had suggested, in addition to the above measures, the introduction from continental stock of species formerly occurring in Britain but now extinct, with particular reference to *Lycaena dispar* and *Cyaniris semiargus*.

Once again the publication of the Committee's proposals was not altogether well received, as immediate objection was made to the introduction of species into new localities, and in March 1926 it was found necessary for the Hon. Secretary to publish an article explaining that it was never the intention to carry out introduction on a large scale, but only to try to form new colonies in the case of species threatened with total extermination.

In the same issue of the *Entomologist* the Editor, for the second time, stated that no more communications on the subject would be published for some time.

Meanwhile, the Committee were continuing their investigations, and on 8th April 1926 the Hon. Secretary issued an appeal on behalf of *L. arion*, stating that "if it is to continue to exist, it is absolutely necessary that collecting should cease until the stock is replenished."

This first request was only a forerunner of the activities of the Committee, a resumé of its work being available annually in the published reports of the Council of the Royal Entomological Society of London.

During this first year, negotiations were commenced for the purchase or lease of land in Cornwall as a sanctuary for *Maculinea arion*, and *Melitaea athalia* was put down in private woodlands in Surrey with the consent and encouragement of the two landowners concerned. Attempts were also made to establish *Melitaea cinxia* in a suitable spot on the south coast.

The Committee commenced experiments with *Lycaena dispar* at Wood Walton Fen and a colony was also put down at Woodbastwick in Norfolk, with the advice and co-operation of Colonel Purefoy, who had been successful in establishing the insect on his estate in Ireland.

In the report for 1927 we read that the experiments with *Melitaea athalia* had been a great success and that the insect was found to be firmly established in woods where it had never previously occurred. The same could not be said, however, of *Melitaea cinxia*, and the attempt to establish it on the mainland had to be admitted a failure.

From 1928 until 1931 most of the energies of the Committee seem to have been devoted to the experiments with *dispar*, which was leading a rather precarious existence, as it is reported that in 1929 the colony was subjected to a very serious attack by parasitic flies which almost wiped it out.

An interesting paper on the past history of *Lycaena dispar*, its various races and the progress that had been made in the efforts to re-establish it at Wood Walton Fen, was prepared by Mr Edelsten and is to be found in the *Proceedings of the Royal Entomological Society of London* for 1931. In this paper Mr Edelsten stated that one of the objects of the Protection Committee was to re-introduce former species not now indigenous, thus confirming the adoption of Mr Sheldon's proposals in May 1925, to which some exception had been taken at that time.

After this heavy attack by parasites, it was found necessary to replenish the remaining stock of *dispar*, and in 1931 three additional colonies were in existence at Wicken Fen, near Reading, and at Leckford on the Test, in addition to the earlier ones at Wood Walton and Woodbastwick.

It had also been reported in 1930 that *Melitaea athalia* was firmly established in various private woods.

By 1931, too, further progress had been made with reserves for the protection of *Maculinea arion*. The lease of suitable land in the Dizzard Valley was secured, warning notice boards were erected, and a watcher of sorts was employed to prevent capture of the butterflies during their season or the destruction of the ant-hills in the search for pupae.

In 1933 steps were taken for the protection of a rare dragon-fly in Surrey, and for the first time we find attention being directed to measures for the preservation of Wicken Fen from threatened overgrowth.

In 1934 the unfortunate *dispar* suffered again from an attack of parasites, and it was also decided in that year to issue an appeal to entomologists to subscribe to a Protection Fund. This stated that the Committee had found that the best means of protection was by the creation of reserves or sanctuaries where the threatened insects might breed unmolested. Such reserves, however, necessitated the employment of watchers and periodical mowing or thinning of the undergrowth, in order to preserve the essential food plants and so on, for which expenditure was needed. The success of the Wood Walton experiment and the limited success of the *arion* sanctuary were cited as encouraging, and the appeal was based on the necessity for the provision of funds for the extension of the work.

The appeal brought in a sum of £50.

In 1935 it was stated that the Committee would welcome information from any entomologist concerning insects or localities in need of protection, and attempts were made to introduce *Apatura iris* into a Kentish woodland where it had formerly occurred.

Nothing much further seems to have happened until 1939, when, with the outbreak of war and the pre-occupation of the members with more strenuous duties, activities came to an end.

In 1943 and 1944 post-war planning was coming under consideration, and the Chairman and Secretary of the Committee were able to render

most useful service by keeping in close touch with the Committee of Management of the National Trust and with the Society for the Protection of Nature Reserves, localities of special interest to entomologists being communicated to that Society.

It was also emphasised in 1944 that it was very necessary for all entomologists to concern themselves with the preservation of additional areas in their own districts.

In 1945 the Committee was unable to take any active steps for protection, whilst it was reported that the lease of the *arion* ground in Cornwall had lapsed and that *dispar* had been badly affected by the very sharp frosts in May.

This year the Committee has been able to resume its activities, and is anxious to obtain suggestions as to how it can prove of further value.

We have now traced the history of "Protection" in this country to the present day, and perhaps it will be possible to learn some lessons from the proceedings of the two Committees which have studied the question.

The first concerned itself only with over-collecting and finally faded away after the formation of the Association pledged to exercise moderation in collecting.

The second Committee, which is still in being, recognised that the preservation of natural habitats and the protection of insects' food plants is just as important as protection from indiscriminate collecting. In my judgment, however, it is unfortunate that it allowed itself to become so engrossed in the task of re-establishing a very beautiful butterfly, partly to exclusion of its main object of protecting our existing fauna, thereby antagonising an appreciable proportion of potential sympathisers. It is noteworthy, too, that up to the present nearly all efforts have been devoted to the interests of the more showy butterflies.

There can be no doubt, however, that the existence of a Protection Committee under the auspices of our premier Entomological Society is of the greatest value, but I believe that means should be found to broaden its basis and to include representatives who could speak for their respective local societies. Money is essential if the Committee is to afford real protection to our insects, but before this will be forthcoming subscribers will want to know how it is to be expended.

At the present time there are two funds—the Wicken Fen Fund and the Protection Fund. The first is collected by an entomologist from entomologists and is handed to the National Trust for expenditure on Wicken Fen, where annual cutting and mowing is essential if the whole Fen is not to become an impenetrable thicket of thorn and alder scrub, useless alike to the botanist or the entomologist.

The Protection Fund is far less widely known and is administered by the Committee in the leasing of sanctuaries, cutting of gorse or bracken, payment of watchers, and so on. That it has failed to gain greater contributions is, I believe, due to an idea that it is used to further the establishment of what is regarded by many as a foreign insect.

I take this opportunity of commending to your generosity these two funds; if Wicken is to be preserved, expenditure beyond the resources that the National Trust can devote to the purpose is essential, and if the Protection Committee is to carry out its proper function of protecting our indigenous lepidoptera funds are likewise necessary.

And now, before I close, I should like to draw a few conclusions regarding what we can all do to save our threatened insects.

Firstly, we can ostracise the ruthless individual who kills more insects than he can possibly require or set. I believe that, even to-day, individuals exist who bottle all they see and then throw away what they do not want. This is abominable, and a very good rule to make is to resolve to set every insect that one kills; to those of us with limited time at our disposal this is an excellent deterrent against unnecessary destruction.

Secondly, entomologists who have ready access to certain areas, such as the habitats of *Melitaea athalia*, *M. cinxia*, or *Maculinea arion*, can do much to preserve the race by rubbing the wings of individuals which they have been examining but do not require.

Thirdly, collectors should never take large numbers of larvae of local insects, in the hope of breeding varieties, unless they can arrange for the release of the insects they do not require in localities where they can be sure of breeding. It would be useless, for instance, to turn out large numbers of *Melitaea athalia* in the north of England, for they would surely perish.

So much for individual collecting. On the question of changing habitats, local collectors can move small colonies to more suitable positions where the food plant may be better placed, or make a report to the Protection Committee, who may be able to arrange for the restoration of the original area after communication with the landowner concerned.

In the same way, and on a larger scale, entomologists should at once report to the Committee any cases that come to their notice of threatened requisitioning of important districts, of drainage work or allocation for building development, etc., which may have grave effects on the existence of particular species. Recent cases of this nature are the requisitioning of Braunton Burrows and the Formby sandhills, the threatened drainage of further areas in the Fens, and the destruction of Watery Grove due to the Stevenage development scheme; whilst, to end on a more cheerful note, the preservation of Hadleigh Wood, in Essex, as a nature reserve some years before the war may be cited as a case of success in this direction.

Ladies and Gentlemen, I have detained you long enough, but before I invite my successor to the Chair I must ask you to bear with me a moment more.

First of all, I want to thank you most sincerely for your support and forbearance during the last two years and for the great honour you did me in extending my term of office for a second year.

Secondly, and most sincerely, I want to give expression to the great debt of gratitude which I owe to the permanent officers of the Society. As I said earlier, we have been a happy party and the Society is, indeed, fortunate to have such able and energetic honorary officers.

Mr Syms has had a busy year in getting the Library into commission once again, and, in another direction, we see the result of his work in the excellent arrangements he has made for our indoor meetings during the winter months.

Our Curator, too, has had extra duties this year with the Collections again available and the installation of the Bright Collection in our rooms. I foresee plenty of work ahead of him, too, as the blown larvae arrive from Mr Ford and have to be collated in their proper sequence.

Mr Classey took over the organisation of our field meetings at short notice and I should like to congratulate him on the result of his first year's work; the weather was against him, but we wish him better luck this year.

Mr Henderson has kept a careful hand upon our finances, and I would remind you that as the Society grows so does the work of the Hon. Treasurer. It is my wish that he may soon be run off his feet!

To the Editor, Mr Eagles, I am very grateful. He has a heavy task and one that never ceases, for no sooner is one set of *Proceedings* out of the way than he must set to and get busy on those for the following year. It is surprising, too, what an amount of laborious work is involved in the preparation of our Papers for the Press, not to mention the reports of our Ordinary meetings.

Finally, I come to the work of the Hon. Secretary, Mr Stanley-Smith, and, as I said last year, he is indeed a tower of strength to the Society. Happy, indeed, are we to have him in that office and thrice happy is the President who has him to rely upon.

To all our honorary officers, therefore, may I express my personal and heartfelt thanks for all their work during the last two years.

Finally, Ladies and Gentlemen, I have the great pleasure of calling upon your new President to take the Chair. Mr Ford is well known to you all and needs no introduction from me, but I must congratulate the Society on obtaining the services of one who is a real naturalist and whose knowledge of the smaller lepidoptera is, I believe, quite unsurpassed.

Once again let me thank you for your kindness, and wish Mr Ford all happiness and success during his term of office.

Votes of thanks were then passed, by acclamation, to the retiring President and to the Officers and Council for their services during the past year.

FIELD MEETINGS, 1946.

OXSHOTT—24th March 1946.

Leader, Mr S. WAKELY.

The first meeting of the season was fairly well attended, there being eight present. Quite a feature of the day was the large number of *Achlya flavicornis* L. seen and taken. They were found, usually in pairs resting within a few inches of each other, on pine and birch trunks, as well as on the smaller branches of birches. Occasionally one was seen flying. *Chimabache fagella* F. was also noted on the tree-trunks, with a few specimens of *Semioscopis avellanella* Hb. The commonest micro was *Peronea ferrugana* Schiff., which was often seen on the wing as well as at rest on the birch twigs. A search was made for the larval cases of *Adela viridella* Scop. under the fallen oak leaves, but only one was found. A member of the party said he had found numbers at the same spot in the autumn.

The black fungus *Daldinia concentrica* Ces. and de Nat. was common on the dead birch trees, but a diligent search produced only one larva of *Myelois neophanes* Durr., which is usually fairly abundant here.

The sallows were very backward, only a few sprays here and there being found with the catkins fully out. Galls of *Aegeria flaviventris* Staud. were found, but as usual were not common. These swellings are easily overlooked, which no doubt accounts for so few being found.

The larvae of *Thera obeliscata* Hb. were frequently met with when beating the pines.

After lunch, the Black Pond was visited, and on the return journey a fine specimen of *Panolis flammea* Hb. was taken at rest on a pine trunk near the station.

Tea was partaken of at the usual refreshment room by the station, and it was decided that the sallows were too backward to warrant an after-dark search. The weather was fine and mild, but sunless.

ASHTED—14th April 1946.

Leader, Mr T. R. EAGLES.

Eleven members and three visitors attended. The day was sunny and very warm and the ground dry. The sloe bushes were in full bloom. The wood anemone also was in flower and its associated fungus, *Sclerotinia tuberosa* Fekl., was observed. Birds seen or heard included the cuckoo, lesser whitethroat, and willow wren. Lizards were abundant. The following butterflies were noticed—*Pararge aegeria* L., *Argynnis selene* Schiff., *Aglais urticae* L., *Nymphalis io* L., *Polygonia c-album* L., and *Gonepteryx rhamni* L.

A few moths were seen, including *Orthosia cruda* Schiff., *O. munda* Schiff., *Brephos parthenias* L. (both sexes), and *Ectropis crepuscularia*.

Hb. The beetle, *Chrysomela populi* L., was found on suckers of white poplar and a number of "sap" beetles were seen on damaged birch trees, including *Librodor quadriguttatus* F. and *Atheta nigricornis* Th.

BENFLEET AND CANVEY ISLAND—28th April 1946.

Leader, Mr C. H. HARDS.

There was a good attendance at this meeting at a collecting ground that had been a prohibited area for so long. Almost immediately on leaving the station nests of the Brown-tail Moth (*Euproctis chrysorrhoea* L.) were seen and when Canvey Island itself was reached it became apparent that there was a plague of the larva. Long stretches of hedge-row were cleared of foliage and many unusual foodplants had been attacked. Larvae of the Lasiocampidae were found freely: *Lasiocampa quercus* L., *Eriogaster lanestris* L. (ova and young larvae), *Trichiura crataegi* L., *Malacosoma neustria* L., *Philudoria potatoaria* L., and *Gastropacha quercifolia* L. There were also larvae of *Aretia villica* L. and of *Euchloris smaragdaria* F. and batches of eggs of *Saturnia pavonia* L. Near the station there was a big colony of the handsome umbellifer, *Smyrniolum olusatrum* L., and in the salt marshes many local plants such as *Limonium vulgare* Mill. (*Statice limonium* L.), *Cochlearia anglica* L., and *Triglochin maritima* L. On the first-named were the larvae of *Agdistis bennetii* Curt.

The coleopterists did not fare so well as the lepidopterists. It was noticed, however, that *Dytiscus circumflexus* F. occurred on the island. Hopes were raised by a large staphylinid beetle with a series of white marks on the dorsal surface. Unfortunately, the white markings proved to be symmetrically arranged colonies of a small mite. Perhaps the best beetle of the day was *Helops caeruleus* L., picked up by the roadside near the station at the end of the day. The tea at the Hoy Inn was excellent and a fitting end to a most enjoyable day.

ASHTED—4th May 1946.

Leader, Mr F. J. COULSON.

The meeting was attended by ten members, seven of whom formed the morning party. The weather conditions at the outset of the meeting indicated a chilly day but when the woods were reached warmer conditions obtained and after noon bright sunshine prevailed.

The following butterflies were observed: *Pararge aegeria* L. (abundant but in worn condition), *Argynnis euphrosyne* L. (males in abundance), *Nymphalis io* L., *Celastrina argiolus* L., *Gonepteryx rhamni* L., *Euchloë cardamines* L. (males), and *Pyrgus malvae* L. Moths seen included *Chiasmia clathrata* L., *Lophopteryx capucina* L., *Ectropis punctulata* Schiff., *E. crepuscularia* Hb., and *Bapta temerata* Schiff. The oaks and hawthorns were beaten for larvae, but apart from *Thecla quercus* L. nothing of interest was taken. Larvae of *Philudoria potatoaria* L. were found on the coarse grasses.

The coleopterists secured a fair number of species but the only Rhynchota species noted was *Harpocera thoracica* Fall. The two dip-terists of the party took many species of interest.

BRENTWOOD—11th May 1946.

Leader, Mr E. E. SYMS.

The day was dull and cold with a Northerly wind. This, no doubt, accounted for the small attendance of members—only four were present.

Nothing worthy of note was seen on the wing. Beating for larvae yielded, in addition to the commoner spring species, a single *Dicycla oo* L. and an abundance of *Pseudoips bicolorana* Fuessl. The following local coleoptera were noted: *Phymatodes alni* L., *Thanasimus formicarius* L., and *Curculio (Balaninus) villosus* F.

Our Secretary collected the members at the close of the meeting and motored them to Hatch House, where they were entertained to tea by Mrs Stanley-Smith.

DURFOLD—25th May 1946.

Leader, Dr H. B. D. KETTLEWELL.

Pleasant weather conditions and a new area for a Field Meeting combined to attract a large attendance. The leader arranged for a coach to be at Cranleigh Station to convey the party to Durfold, which proved to be a most interesting and productive locality. Insects on the wing included *Argynnis selene* Schiff., *A. euphrosyne* L., *Leptidea sinapis* L., *Eulype hastata* L., and *Anagoga pulveraria* L. Larvae were abundant. In addition to many nests of *Orthosia miniosa* Schiff. there were plenty of *Trichiura crataegi* L., *Brachionycha sphinx* Hufn., *Pseudoips bicolorana* Fuessl., *Polyphoca ridens* F., *Thecla quercus* L., *T. betulae* L., *Apocheima hispidaria* Schiff., *Aegeria flaviventris* Staud. and *A. sphecoformis* Schiff.

A pale buff form of *Phigalia pilosaria* Schiff. (= *pedaria* F.) and an albino *Laethoë populi* L. were noticed.

Coleoptera taken included *Staphylinus latebricola* Grav., *Zeugophora subspinosa* F., *Leptura cerambyciformis* Schr., *Strangalia nigra* L., *Lamprosoma concolor* Sturm, *Mordella aculeata* L., *Mordellistena abdominalis* F., and *Byctiscus betulae* L. (= *betuleti* F.).

Dr and Mrs Kettlewell entertained the party of about 40 to tea. The guests were shown Dr Kettlewell's arrangements for rearing larvae and were greatly interested to note his methods.

ASHTED—2nd June 1946.

Leader, Mr T. R. EAGLES.

The eight members who attended despite a falling barometer, a bad forecast, and rain early on were rewarded with a fine day and some interesting collecting. *Pseudopanthera macularia* L. was flying freely. On the tree trunks there was a fair assortment of moths, including *Dasychira fascelina* L., *Boarmia punctinalis* Scop., *Bapta temerata*

F. Beating sloe bushes for larvae yielded an abundance of *Theria rupicapraria* Schiff. and *Episema caeruleocephala* L. On the oaks there were *Thecla quercus* L. and *Orthosia miniosa* Schiff. and on the birches *Achlya flavicornis* L. Full-fed larvae and pupae of *Aegeria vespiformis* L. were extracted from an oak stump. The following imagines of the smaller moths were seen: *Spuleria flavicaput* Haw., *Schiffermuelleria angustella* Hb., *Coleophora genistae* Staint., and *Bucculatrix ulmella* Zell. Larvae of *Eurhodope advenella* Zinck., *E. suavella* Zinck., and *Coleophora nigriceila* Steph. were taken. The most interesting beetle seen was *Elater elongatulus* F., beaten from oak. Others included *Phymatodes alni* L., *Anaglyptus mysticus* L., *Leipus nebulosus* L., *Saperda populnea* L., *Attelabus nitens* Scop., *Curculio (Balaninus) venosus* Grav. and *C. (B.) glandium* Mars. An interesting variety of the last named was clothed with pale grey scales and a few white markings. The only example of the larger fungi to attract attention was *Hygrophorus obrusséus* Fr.

BROADWATER FOREST—22nd June 1946.

Leader, Dr G. V. BULL.

The leader and Mr Jacobs very kindly motored the party from Tunbridge Wells to the collecting ground. In places it was much damaged by the military. There were deep trenches, barbed wire, and large metal objects on the ground and fastened to trees. In the main, however, the attractions of the locality were unimpaired and in the damper spots the ferns and mosses were growing with a luxuriance far exceeding that seen in areas nearer London. Two orchids, the Twayblade (*Listera ovata* L.) and the Spotted Orchis (*Orchis maculata* L.) were abundant and there were large patches of Lousewort (*Pedicularis sylvatica* L.). Large nests of the Wood Ant (*Formica rufa* L.) were plentiful and the inhabitants were very active, making larva beating impossible in some places.

Among the lepidoptera seen on the wing and on tree trunks the following are some of the more interesting: *Argynnis selene* Schiff., *Callophrys rubi* L., *Diacrisia sannio* L., *Haplotis venustula* Hb., *Ellopija prosapiaria* L. (= *fasciaria* Schiff.), *Lyncometra ocellata* L., *Hydriomena impluviata* Schiff., *Boarmia roboraria* Schiff., *Semiothisa notata* L., *S. liturata* Clrck., *Eucosma demarniana* Fisch., and *Enarmonia coniferana* Ratz. The larvae of *Eucosma sordidana* Hb. were found freely spun up in the leaves of alder. While searching for them a larva of *Geometra papilionaria* L. was noticed. In the same spot near the stream the birches yielded many larvae of *Achlya flavicornis* L. and *Brephos parthenias* L. On the Scots Pine were a fair number of larvae of *Panolis flammea* Schiff. (*griseovariegata* Goeze). Beetles noted casually included *Thanasimus formicarius* L., *Asemum striatum* L., *Hylobius abietis* L., and *Sinodendron cylindricum* L. While resting some members of the party had an excellent opportunity of watching the Greater Spotted Woodpecker at work.

Tea was taken at the High Rocks Hotel, where the tables were decorated with the charming pink blossoms of the North American shrub, *Kalmia latifolia* L., no doubt grown on the local peat soil.

ALICE HOLT FOREST, FARNHAM—7th July 1946.

Leader, BARON DE WORMS.

This extensive forest area, which is one of the oldest in the country, had not been visited before by the Society, and it is surprising how few entomologists have worked this very rich locality.

Nine members assembled at Bentley Station about 10.45 and were joined there by three others including our President.

Fortunately, the day was very warm and sunny and conditions ideal for collecting. The route taken was in a north-easterly direction along the main right-of-way through the Forest. This gave an opportunity of investigating the clearings on either side which were flanked by very fine oaks. But it soon became apparent that in spite of the sunshine Lepidoptera, especially butterflies, were unusually scarce for the time of year, and this has also been the case in most other parts of the southern counties.

Shortly after setting out *Argynnis paphia* L. was observed, but probably less than a dozen were seen during the whole day and not many more *Limenitis camilla* L., which is as a rule very abundant. It was hoped that *Apatura iris* L. would put in an appearance, but it was evidently too early for it this year.

Vanessa atalanta L. was much in evidence and one *Colias croceus* Fourc. was seen.

Among the moths the most spectacular were three female *Boarmia roboraria* Schiff. on tree trunks and one *Polia nebulosa* Hufn. *Plusia gamma* L. was fairly numerous and a single *Cochlidion limacodes* Hufn. was beaten out. Foxgloves were very well patronised by *Eupithecia pulchellata* Steph.

Of the smaller species it was interesting to find galls of *Mompha decorella* Steph. in *Epilobium montana* L. *Eucosma corticana* Hb. was very plentiful as well as *Ypsolophus xylostellus* L.

Larvae were also far from numerous. A few *Lymantria monacha* L. were beaten from oak.

Many interesting species of Coleoptera were obtained by Mr L. G. Payne. He also secured a form of Cow-wheat with purple flowers.

Finally the party assembled at five o'clock at the Halfway House, Buckshorn Oak, where an excellent tea was provided in the garden. The bus was taken into Farnham to rejoin the train after what was a very enjoyable, if not a very productive day.

Species observed on the Field Meeting:

Lepidoptera.—Butterflies—*Pieris brassicae* L., *P. rapae* L., *Colias croceus* Fourc., *Limenitis camilla* L., *Aglais urticae* L., *Vanessa atalanta* L., *Argynnis paphia* L., *A. selene* Schiff., *Pararge aegeria* L., *Maniola*

jurtina L., *Thecla quercus* L., *Augiades sylvanus* Esp.

Moths.—*Macroglossum stellatarum* L., *Polia nebulosa* Hufn., *Plusia gamma* L., *Cleora repandata* L., *Boarmia roboraria* Schiff., *Cidaria fulvata* Forst., *Hemithea strigata* Muel., *Plemyria bicolorata* Hufn., *Cochlidion limacodes* Hufn., *Mitochrista miniata* Forst., *Campaea margaritata* L., *Mompha decorella* Steph., *Mompha schrankella* Hb., *Endotricha flammealis* Schiff., *Eucosma corticana* Hb., *Ypsolophus xylostellus* L. Larvae—*Lymantria monacha* L., *Eupithecia pulchellata* Steph., *Biston strataria* L., *Gracillaria elongella* L.

Coleoptera.—*Pterostichus minor* Gyll., *Strangalia maculata* Poda, *Grammoptera ruficornis* F., *Leptura livida* F., *Amara familiaris* Duft., *Aphidecta oblitterata* L., *Malthodes minimus* L., *Cantharis rustica* Fall., *Phyllodecta vitellinae* L.

BETCHWORTH—14th July 1946.

Leader, S. WAKELY.

In spite of one or two heavy rain-storms the weather did not prevent those present from having an enjoyable day. After the rain the sunshine was brilliant, and both sexes of *Lysandra coridon* Poda were flying in numbers in beautiful condition. *Setina irrorella* Clrk. was also on the wing in plenty, one larva of this species being found. Single specimens of both *Polygonia c-album* L. and *Vanessa cardui* L. were noted, and a fine specimen of *Macroglossum stellatarum* L. was netted. Imagines of *Coleophora onosmella* Brahm were frequent among the plants of Viper's Bugloss, which were growing in profusion in the quarries. Other larvae found were *Smerinthus ocellatus* L. on Sallow, *Horisme vitalbata* Schiff. on Clematis, and *Stephensia brunnichiella* L. on *Clinopodium vulgare* L. (Basil).

Tea was partaken of at the Barley Mow, the party numbering eight and the catering being excellent.

ASHTREAD—20th July 1946.

Leader, Mr F. J. COULSON.

The weather conditions were fair but there was little sunshine. Twelve members and friends were present at tea. During the day the common and the woods were worked, and after tea a short time was spent at the pondside.

The only butterflies noted on the wing were: *Maniola jurtina* L. and *Thymelicus sylvestris* Poda. Moths noted were: *Agrotis exclamationis* L., *Hemithea strigata* Muell., *Phlyctaenia lutealis* Hb., *Euxanthia hamana* L., *Crambus culmellus* L., and *Mompha stephensi* Staint. Larvae beaten were *Cosymbia pendularia* Clrk., *Drepana lacertinaria* L., *D. falcataria* L., *Notodonta ziczac* L., *Pterostoma palpina* L. From the

bulrushes in the pond near the village many pupae of *Nonagria typhae* Thnbg. were obtained.

The Heteroptera noted more or less commonly were *Myrmus miriformis* Fall., *Notostira erratica* L., *Deraeocoris ruber* L., *Capsus meriopterus* Scop., *Phylus coryli* L. (var. *avellanae* Meyer-Duer) and *P. palliceps* Fieb., *Nabis ericetorum* Scholtz, *Stenotus binotatus* F., *Pithanus märkeli* H.-S., *Phytocoris ulmi* L., *Calocoris norvegicus* Gmel., *Lygus contaminatus* Fall., *Plagiognathus chrysanthemi* Wolff, *P. arbustorum* F., *Psallus betuleti* Fall., *P. varians* H.-S., and *Dictyonota strichnoceru* Fieb. (from gorse).

The following Homoptera were more or less abundant: *Neophilaenus lineatus* L., *Aphrophora spunaria* L. (= *alni* Fall.), *A. salicis* Deg., *Aphrodes bicinctus* Schrank (= *nervosus* Schrank), *Cixius pilosus* Ol., and *Tettigoniella viridis* L.

Coleoptera were not abundant, but the following were taken or noted: *Abax parallelopipedus* P. & M. (= *ater* De Vill.), *Stenolophus teutonius* Schrank, *S. mixtus* Herbst, *Bembidion lunulatum* Fourc., *B. lampros* Herbst, *Dromius linearis* Ol., *D. quadrinotatus* Panz., *Acupalpus luridus* Dej., *Hygrotus impressopunctatus* Schall., *Anacaena globulus* Payk., *Philonthus quisquiliarius* Gyll., *P. micans* Grav., *Scirtes hemisphaericus* L. (abundantly by the pond), *Cyphon variabilis* Thnbg., *C. ochraceus* Steph., *Malthinus fasciatus* Ol., *M. balteatus* Suff., *Malthodes minimus* L., *Cantharis fulvicollis* F., *Lema lichenis* Voet, *Phaedon cochleariae* F., *Cryptocephalus pusillus* F., *C. fulvus* Goeze, *Byturus tomentosus* Deg., *Laria dulcamarae* Scop., *Olibrus liquidus* Erich., *Mordellistena newwaldeggiana* Panz., *Attelabus nitens* Scop., *Lasioryhynchites cavifrons* Gyll., *Apion viciae* Payk., *Ceuthorhynchus litura* F., *C. melanarius* Steph., *Curculio (Balaninus) venosus* Grav., *C. (B.) glandium* Marsh. and *Balanobius salicivorus* Payk.

Plant Galls: (1) Cynipidae on *Quercus robur* L.—*Adleria kollari* Htg., *Neuroterus lenticularis* Ol., *N. fumipennis* Htg., *N. tricolor* Htg., *Andricus curvator* Htg., *A. ostreus* Htg., *A. fecundator* Htg., *Diplolepis longiventris* Htg., and *D. folii* L. Tenthredinidae—*Pontania bridgmanii* Cam., on *Salix atrocinerea* Brot. and *S. caprea* L. Cecidomyiidae—*Rhabdophaga nervosum* Kieff. and *Iteomyia major* Kieff., on *Salix atrocinerea* Brot. *Putoniella marsupialis* F. Lw. and *Dasyneura crataegi* Winn. on *Crataegus monogyna* Jacq. *D. ulmariae* Br.-Wlf. on *Spiraea ulmaria* L. *D. ranunculi* Br.-Wlf. on *Ranunculus repens* L. *D. epilobii* F. Lw. on *Epilobium angustifolium* L. *D. trifolii* F. Lw. on *Trifolium repens* L. and *pratense* L. *D. affinis* Kieff. on *Viola* sp. *Wachtliella stachydis* Br.-Wlf. on *Stachys sylvatica* L. *Contarinia tragopogonis* Kieff. on *Tragopogon pratensis* L. Aphididae—*Aphis crataegi* Fourc. on *Crataegus monogyna* Jacq. Eriophyidae—*Epitrimerus trilobius* Nal. on *Sambucus nigra* L. *Eriophyes crataegi* Can. and *E. goniothorax* Nal. on *Crataegus monogyna* Jacq. *E. macrorrhynchus* Nal. and *E. macrochelus* Nal. on *Acer campestre* L.

ASH VALE—11th August 1946.

Leader, Mr E. W. CLASSEY.

The weather was perfect. This must be accounted very fortunate because the day before and the day after were both wet and the forecast had been unfavourable. Many species of dragonflies were on the wing. Lepidoptera also were plentiful. The local heath form of *Eumenis semele* L. attracted the attention of the party, who were more accustomed to the chalk form. A variety of *Maniola jurtina* L. with large white patches was taken. Other butterflies seen included *Pararge aegeria* L., *Maniola tithonus* L., *Vanessa atalanta* L., *Aglais urticae* L., *Plebejus argus* L., *Polyommatus icarus* Rott., *Celastrina argiolus* L. The moths *Pseudoterpnæ pruinata* Hufn. and *Lycophotia varia* Vill. (*porphyrea* Schiff.) were flying. Belated imagines of *Anarta myrtilli* L. were seen, as also were young larvae. Sweeping produced larvae of *Hadena serena* Schiff. and *Ectypa glyphica* L. Beating yielded *Cerura furcula* Clrck., *Notodonta ziczac* L. and *Drepana lacertinaria* L. Eggs of *Clostera curtula* L. were found on a shrub which seemed to be a hybrid between aspen and white poplar. Beetles were plentiful. Both sexes of *Strangalia quadrifasciata* L. were taken. Around a dead shrew were *Oeceptoma thoracicum* L. and a number of *Dermestes* sp. A birch tree attacked by the goat moth was investigated. Many larvae of *Cossus cossus* L. and a host of wasps were found. The courage of the searchers was rewarded by an abundance of *Soronia grisea* L. and *S. punctatissima* Ill. *Hoplia philanthus* Fuessl. was taken. The two species *Chrysomela populi* L. and *C. tremulae* F. seemed equally common. On the pines were *Anatis ocellata* L. and a very beautiful form of *Mysia oblongoguttata* L.

Narrow ditches cut in the peaty soil were red with young plants of *Drosera rotundifolia* L. Almost every plant of *Hieracium boreale* Fries had its stem inflated by the gall of *Aulacidea hieracii* Bouch. Of fungus only *Scleroderma vulgare* Hornem. was plentiful, but there were a few *Amanita rubescens* Pers. and enough *Amanitopsis fulva* W. G. Sm. to make a meal.

GOMSHALL—18th August 1946.

Leader, Mr R. W. PARFITT.

The unsettled and rainy weather which had persisted for the preceding two weeks no doubt discouraged some members from attending this meeting and most of the seven members comprising the party arrived fully armed with waterproof apparel. However, they were fortunate and the day turned out to be one of the best of the month, with long sunny periods.

The area visited included Hackhurst Down and the fields and lanes leading up to it from the main road.

Butterflies were fairly numerous and included most of the typical chalk-loving species; a few larvae of *Vanessa cardui* L. were obtained;

moths were few and larva-beating very unproductive, the only capture of note being a single half-grown caterpillar of *Thyatira batis* L. beaten from a bramble-covered hedge.

Mr L. Parmenter, the Dipterist of the party, found enough of interest to keep him busy, and a list of the flies taken or noted on this occasion is appended.

Asilidae—*Asilus crabroniformis* L., *Machimus atricapillus* Flin.
 Syrphidae—*Myathropa florea* L., *Eristalinus sepulchralis* L., *Tubifera tenax* L., *T. intricaria* L., *T. arbustorum* L., *T. horticola* Deg., *Helophilus hybridus* Lw., *H. pendulus* L., *Ferdinandea cuprea* Scop., *Zelima segnis* L., *Syritta pipiens* L., *Rhingia macrocephala* Harris, *Cartosyrphus scutellatus* Flin., *Chrysogaster solstitialis* Flin., *Melanostoma scalare* Fab., *Platycheirus albimanus* Fab., *Chrysotoxum bicinctum* L., *Scaeva pyrastræ* L., *Syrphidis ribesii* L. Conopidae—*Conops quadri-fasciata* Deg., *C. flavipes* L. Larvaevoridae—*Varichaeta radicum* Fab., *Eriothrix rufomaculatus* Deg., *Larvaevora fera* L., *Calirrhoe siberita* Fab., *Alophora hemiptera* Fab., *Hyalomya obesa* Fab., *Rhodogyne rotundatum* L. Calliphoridae—*Sarcophaga subvicina* Rohd., *Calliphora vomitoria* L., *Onesia aculeata* Pand., *Melinda caerulea* Mg., *Pollenia rudis* F. Muscidae—*Musca autumnalis* Deg., *Graphomya maculata* Scop., *Mesembrina meridiana* L.

SCRATCH WOOD—31st August 1946.

Leader, Mr R. W. SPARROW.

The leader was unable to be present. Four members turned up, but almost immediately very heavy rain set in for the day and made work almost impossible. The two coleopterists took a few beetles.

CHILWORTH—15th September 1946.

Leader, Mr R. W. PARFITT.

Weather conditions were again favourable for this meeting, which was attended by six members.

The area worked was Blackheath, and in particular the South-Eastern end, where it was thought the numerous small birches, oaks and pines would provide good larva beating.

As appears to be generally the case this year, however, larvae were found to be definitely scarce and species which are usually abundant at this season, such as *Dasychira pudibunda* L. and *Biston betularia* L., were only beaten out occasionally.

A few young *Geometra papilionaria* L. larvae were obtained from the birches, and the ling, of which there is a luxurious growth here, produced numerous Geometrid larvae, including several *Eupithecias* as well as a number of *Anarta myrtilli* L. in various stages of growth; but most of these were subsequently found to be parasitized.

Lepidopterous larvae noted, and not mentioned above included: *Lophopteryx capucina* L.; *Macrothylacia rubi* L.; *Habrosyne derasa* L.; *Bena prasinana* L.; *Apatele psi* L.; *Lycophotia varia* Vill. (= *porphyrea* Schiff.); *Ceramica psi* L.; *Cosymbia punctaria* L.; *Thera obeliscata* Hb.; *Eupithecia goossensiata* Mab.; *E. nanata* Hb.; *Semiothisa liturata* Clrck.; *Pachynemia hippocastanaria* Hb.; *Bupalus piniarius* L.; and pupae of *Saturnia pavonia* L.; *Panolis flammea* Schiff. (*griseovariegata* Goeze).

ASHTREAD—28th September 1946.

Leader, Mr F. J. COULSON.

Ten members attended the meeting. The weather conditions were satisfactory and a pleasant day was spent by all.

Pararge aegeria L., *Gonepteryx rhamni* L., and *Nymphalis io* L. were the only butterflies noted. Larvae of lepidoptera were rather scarce, but *Notodonta ziczac* L., *Apatele rumicis* L., *Gastropacha quercifolia* L., *Biston betularia* L. and *Cosymbia punctaria* L. were observed, also *Perizoma bifasciata* Haw. on *Odontites rubra* Gilib. (= *Bartsia odontites* L.).

The coleopterists of the party were successful in adding at least ten additional species to the local list.

The following Homoptera were noted: *Euscelis sordida* Zett., *Erythroneura scutellaris* H.-S., *Deltocephalus pascuellus* Fall., *Typhlocyba crataegi* Dougl., and the following Hemiptera: *Empicoris vagabundus* L. from oak, *Pantilius tunicatus* F. from hazel, *Kleidocerys resedae* Panz., *Nabis rugosus* L. and *N. major* Costa.

The only fungi noticed were *Boletus scaber* Bull., *Tricholoma flavobrunneum* Quel. and *Collybia butyracea* Quel.

OXSHOTT—13th October 1946.

Leader, Mr W. J. FINNIGAN.

This fungus foray was attended by six members and three visitors. Fine weather prevailed throughout the day. However, following, as it did, a rather dry spell, fungi were not as numerous as they might have been. Nothing of particular merit was seen but upwards of fifty species were recorded, a fairly representative collection for the district, as the following list will show:

Amanita rubescens Pers., *A. pantherina* Secr., *A. muscaria* Pers., *Amanitopsis fulva* W. G. Sm., *Tricholoma rutilans* Schaeff., *Russula emetica* Fr., *R. ochroleuca* Fr., *Mycena citrinella* Pers., *Collybia maculata* Quel., *Lactarius turpis* Fr., *L. vietus* Fr., *L. torminosus* Fr., *L. rufus* Fr., *L. quietus* Fr., *Laccaria laccata* Scop., *Panus stypticus* Fr., *Lenzites betulina* Fr., *Pezizella involutus* Fr., *Inocybe umbrina* Fr., *Flammula sapinea* Quel., *Cortinarius cinnamomeus* Fr. (var. *semi-sanguineus* Maine), *Hypholoma fasciculare* Quel., *Boletus variegatus* Swartz, *B. scaber* Bull., *B. badius* Fr., *B. versipellis* Fr., *Polyporus amorphus* Fr., *P. schweinitzii* Fr., *P. albidus* Quel., *P. adiposus* B. & Br., *P. adustus*

Fr., *Fomes annosus* Cooke, *Polystictus perennis* Fr., *P. versicolor* Fr., *P. abietinus* Cooke, *Trametes gibbosa* Fr., *T. rubescens* Fr., *Hydnum repandum* Linn., *H. melaleucum* Fr., *H. ferrugineum* Fr., *Phlebia merismoides* Fr., *Stereum hirsutum* Pers., *Thelephora terrestris* Pers., *Sparassis crispa* Fr., *Clavaria argillacea* Pers., *Calocera viscosa* Fr., *Scleroderma vulgare* Hornem., *Lycoperdon pyriforme* Schaeff., *Galactinea badia* Pers., *Rhizina undulata* Fr., *Coryne sarcoides* Tul., *Daldinia concentrica* Ces. & De Nat., *Cordyceps militaris* F. *Claviceps purpurea* Tul. was observed on the grass *Molinia caerulea* L.

The mould *Sepedonium chrysospermum* was seen on species of agarics and boleti, and a mycetozoon *Lycogala epidendrum* Fries. turned up on an old pine stump.

Tea was taken at the Hut, Oxshott Station, at about five o'clock, after which the party dispersed.

MICKLEHAM DOWNS—20th October 1946.

Leadèr, Mr W. H. SPREADBURY.

The dry spell that preceded this fungus foray made specimens extremely scarce.

Under the beech trees *Geaster triplex* Jungh. was found in various stages of development. Those fully expanded were in a dried-up state, but by taking an unopened example and keeping it moist members unfamiliar with the species were able to see its full perfection. Almost the only other fungus of interest and in good condition was *Mutinus caninus* Fr. A ripe specimen of *Lycoperdon pyriforme* Schaeff. was found to house the Clavicorn beetle *Lycoperdina bovistae* F.

BRITISH BATS.

By J. FINCHAM TURNER.

Read 13th February 1946.

ORDER CHIROPTERA.

The Order is divided into two Sub-Orders.

(1) MEGACHIROPTERA.*Fruit-eating Bats of the Tropics and Sub-tropics.*

The crowns of the molar teeth are smooth with a longitudinal groove along the middle. The nostrils simple openings without any leaf-like folds surrounding them. The ears are also simple, set well apart, usually pointed and without a tragus. The second digit or index finger has a distinct claw. The tail is rudimentary or absent. There is no spur (or calcar) and no interfemoral membrane.

Generally speaking, they are large bats with dog-like head and are commonly known as Fox Bats or Flying Foxes.

(2) MICROCHIROPTERA.*This Sub-Order contains all the Insectivorous Bats.*

The face is broad and short. Crowns of the molar teeth have sharp tubercles, more or less separated by cross furrows. The fingers are without a claw. The tail is distinct and united to the interfemoral membrane.

There are only 12 British species. At one time the list contained 15 species, including stray Continental bats which had found their way to some seaport in cargo or ship's rigging.

All British bats hibernate during the winter months, approximately from the end of October to the end of March according to the season.

They pair in the autumn, from the middle of September to early October. After hibernation the sexes divide and small colonies of each sex take up their summer quarters in holes in trees, old buildings, and old ivy-covered walls or any other place they may find suitable.

The young are born between the middle of June and July. Only one young bat is produced each year, so we must assume that bats are fairly long lived.

The young are carried about by the mother until they become too heavy; they are then left at home while the mother is out hunting. By the middle of August they are able to fend for themselves, and it seems that they fly by instinct.

The first two bats I will take belong to the

Family RHINOLOPHIDAE,

and are commonly known as Horseshoe Bats. Both species possess a curious leaf-like process on the snout. There is no tragus or inner ear. The ears are pointed and broad at the base. Both species have 32 teeth;

the two upper incisors are quite rudimentary. The first two ribs are fused together and to the backbone, forming a solid ring of bone right round the shoulders. The first hind toe has only two joints. All the others have three joints. All Horseshoe Bats hold the tail curved upwards over the back instead of curved downwards under the body as do the Vespertilionidae.

The young are not usually born until early July and are clothed with short silky, downy hair, most noticeable on the back, shoulders and head. Both species are very gregarious.

The leaf-nosed bats are distributed over the temperate and tropical regions of the Eastern Hemisphere, where they are represented by several genera and a large number of species.

THE GREAT HORSESHOE BAT.

Rhinolophus ferrum-equinum (Schreber).

Wing span, 13" to 14". Head and body, 2½". Tail, 1¼".

Reddish-grey colour, paler on the underside and less red. The wing membranes are proportionately broad and are attached to the ankle. Ears large and broad at the base, turning outwards, and terminating in a point. Tragus absent. The flight is very graceful, often quite low and this bat will alight at times to consume its prey. Caves seem to be their favourite place to sleep during the day and for hibernation.

THE LESSER HORSESHOE BAT.

Rhinolophus hipposideros (Bechstein).

Wing span, 9". Head and body, 1½". Tail 1⅛".

Colour light brown above, yellowish-brown below, otherwise similar to the Great Horseshoe. Flight very quick, the wing beats being faster than those of any other British bat.

Both species are to be found in localities where caves provide the equable temperature required for successful hibernation.

Family VESPERTILIONIDAE.

The largest family in the whole Order.

There are 10 British species. They have a well-developed tragus, the shoulder ribs are not fused together, and the leaf-like process on the nose is absent.

THE GREAT BAT OR NOCTULE.

Nyctalus noctula (Schreber).

Wing span, 14"-15". Head and body, 3½". Tail 1½" (average).

Colour bright chestnut-brown, under-parts slightly paler. The base of the fur is paler than the tip. The wing is long and narrow owing to the shortness of the 5th finger; the membrane is attached to the ankle in this and the next species. The last joint of the tail is free from the leg-web.

This is our largest British bat and is on the wing early in the evening, often before the sun has set. The flight is not unlike that of the

Swift, and they are often on the wing at the same time. They fly fast and often very straight and at a height far higher than most of our other bats. They often dive low when following insects. The Noctule has a strong call and is sometimes very noisy—the call is very shrill. They remain on the wing for about $1\frac{1}{2}$ hours in the evening, and only about 30-40 minutes in the dawn flight.

The Noctule has a strong offensive smell, which is produced from glands in the mouth. If kept in captivity they must be hand-fed as they never seem able to take food from the floor of the cage and will soon starve to death. Both the Noctule and the next species have 34 teeth.

LEISLER'S OR HAIRY-ARMED BAT.

Nyctabus leisleri (Kuhl.).

Wing span, 12" to 13". Head and body, $2\frac{1}{2}$ ". Tail, $1\frac{1}{2}$ ".

Colour glossy clove-brown or chestnut, underside greyish-brown. Without the strong offensive smell of the Noctule and the base of the fur is dark at the roots, nearly black on the underside.

Leisler's bat is very similar to the Noctule but slightly smaller and not so robust. The flight is fast and rather erratic—it does not fly as high as the Noctule and the wings are brought well below the body on the downward stroke.

This bat is always found in trees and not buildings. Like the Noctule it has a wide range, extending as far North as Yorkshire or beyond and is common in Ireland.

SEROTINE BAT.

Vespertilio serotinus (Schreber).

Wing span, 14". Head and body, 3". Tail, 2". Ears, $\frac{3}{4}$ " long, tips rounded. Tragus, $5/16$ th" long.

Colour dark brown tinged with creamy-white, underside yellowish-white. There are prominent glandular swellings on the muzzle and a curious callosity at the base of the thumb. The wing membrane is attached to the toe. The Serotine Bat has 32 teeth. The flight is slower and wavering compared to the Noctule and it often takes headlong dives which appear to be quite out of control. It is a sociable species and numbers may be seen on the wing together.

It is only found in the South of England, especially in the Isle of Wight and Kent. It is not a very successful bat to keep in captivity as it is not easily tamed and can bite severely.

THE PIPISTRELLE OR COMMON BAT.

Vespertilio pipistrellus (Schreber).

Wing span, 8" (average). Head and body, $1\frac{1}{2}$ ". Tail, $1\frac{1}{8}$ ".

The colour is variable, usually greyish-black to deep ruddy brown. White or partly white examples frequently turn up. The wing is nar-

row and attached to the sole of the foot. The last joint of the tail extends beyond the interfemoral membrane and is used as an extra claw when climbing a rough surface. It has 34 teeth. The flight is quick and erratic, not more than 15 to 20 feet high. It is noisy in flight and frequently utters shrill high-pitched squeaks as it catches flies and other small insects, which are eaten without alighting.

It seems to fly throughout the night and is active for a longer period than any other British bat. The hibernation is less prolonged than in any other species; it may be seen out hunting during the winter months if the temperature rises much over 50° F.

The Pipistrelle is our smallest and commonest bat; it is found throughout the British Isles and westward to Ireland. Its range also includes Europe and parts of Asia.

The next four Bats belong to the Genus *Myotis*. They all have 38 teeth. This genus is the largest and most widely distributed of all the genera of Bats.

WHISKERED BAT.

Myotis mystacinus (Kuhl.).

Wing span, 9". Head and body, 1½". Tail, 1½".

Colour sandy-brown above, greyish-brown on the underside. Its muzzle is not so broad as in the Common Bat and it has long hair on face extending to the upper lip. The wing membrane is attached to the base of the toe and the spur (calcar) reaches half way from the ankle to the tail.

This bat is frequently confused with the Common Bat, but the Whiskered Bat is silent on the wing and usually solitary in habits. It often takes insects from leaves and flowers and is easy to keep in captivity. It is widely distributed throughout the British Isles as far North as parts of Scotland.

DAUBENTON'S OR WATER BAT.

Myotis daubentonii (Kuhl.).

Wing span, 10" to 10½". Head and body, 2". Tail, 1¼".

Colour warm reddish-brown above and light brown or buff on the underside. The basal half of all the hairs is dark brown. The wing membrane rises from the middle of the foot; the feet are large and have some whitish hairs on the toes. The spur (calcar) extends three-quarters of the distance from the ankle to the tail, the last two joints of which are free from the interfemoral membrane.

Daubenton's Bat is found commonly along rivers and streams or any fairly large sheet of water. I have seen it flying over the lake in St James' Park. It is on the wing about half-an-hour after sunset, flying low over the water; it often sails along with wings raised over the back forming a V. It often touches the water when taking insects from the surface. It is not so easy to net as one would expect as its flight is much faster than it appears

NATTERER'S OR REDDISH-GREY BAT.

Myotis nattereri (Kuhl.).Wing span, 11" to 12". Head and body, $2\frac{1}{4}$ ". Tail, $1\frac{3}{4}$ ".

Colour brown tipped with grey, underside almost white or silvery-grey. Face covered with fur and a fringe of hairs along the outer margin of the interfemoral membrane. The wings are broad in proportion and extend to the base of the outer toe.

It is easily recognised on the wing by its almost white underside, its steady flight and rather loud call. It takes its food from flowers and leaves; it soon becomes tame and will feed itself from the floor of its cage. When flying in a room it will be noticed that it can turn a complete somersault in the air and alight upside down on any rough surface, picture-rail, etc.

Natterer's Bat is very sociable and gregarious. Although they are usually to be seen in the neighbourhood of trees they sometimes frequent open water.

BECHSTEIN'S BAT.

Myotis bechsteinii (Kuhl.).Wing span, 10" to 11". Head and body, 2". Tail, $1\frac{1}{2}$ ".

Colour greyish-brown above and pale buff on the underside. The base of all hairs is dark brown. The ears are large and broad, rather oval in shape, and nearly one inch in length. The wing membrane is dark sepia and is attached to the base of the toe. The last joint of the tail is free from the interfemoral membrane.

Bechstein's is our rarest bat. I have yet to see my first living specimen. So far it has only been reported from a few localities in the South and S. West of England. On the Continent it is restricted to central and southern Europe.

LONG-EARED BAT.

Plecotus auritus (Linn.).Wing span, 10" to $10\frac{1}{2}$ ". Head and body, $1\frac{3}{4}$ ". Tail, $1\frac{3}{4}$ ".

Colour brown above, yellowish-grey on the underside. The fur is long, very soft and silky. They have 36 teeth. Ears, $1\frac{1}{2}$ " long \times $\frac{1}{2}$ " wide, united at the base, and capable of independent movement.

The food is mostly picked from leaves and flowers, and it usually alights to eat its prey, sometimes on the ground. It can often be seen hovering over flowers and sallow catkins when hunting for moths.

Owing to its huge ears this bat can never be confused with any of our other bats. It is one of the commonest and most widely distributed of our bats. The Long-eared Bat is one of the easiest to keep in captivity, becoming exceedingly tame in a very short time—it will even come when called to be fed.

BARBASTELLE BAT.

Barbastella barbastellus (Schreber).Wing span, 10". Head and body, 2". Tail, $1\frac{1}{2}$ ".

Colour black, hairs tipped with grey, which give the bat a frosted appearance. The fur is very soft and dense, rather similar to that of a mole. The wings are practically jet-black. The ears are relatively large, united at their bases; the outer border is deeply notched and the lance-shaped tragus is half the length of the ear. It has 34 teeth. It is usually silent on the wing but often grunts when handled.

I have found the Barbastelle very difficult to keep in captivity. It cannot feed itself and is very difficult to hand-feed.

All our bats are of great value to man, and should be protected and encouraged where circumstances permit. In certain parts of U.S.A. bats are protected by the State and special " Bat Houses " have been constructed with a fair amount of success.



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AN INTRODUCTION TO THE STUDY OF COLLEMBOLA.

By PHILIP M. MILES, F.R.E.S.

Read 27th February 1946.

I have endeavoured to survey broadly the work that has been done on Collembola, and to present a picture of the state of our knowledge on this subject. While primarily an introduction for the beginner, it will, I hope, also be of interest to entomologists in general, and, by its shortcomings, will suggest subjects for prospective workers to investigate.

A compilation is drawn from many sources to which it is not possible to refer individually except when the text is largely based on one work. The authors from whom many interesting facts have been gleaned are mentioned in the list of references. The classification used, except for non-British species, is that of Kloet, G. S., and Hincks, W. D., 1945, *A Check List of British Insects*.

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Dorsal Vessel.	Bibliography.

THE AFFINITIES OF COLLEMBOLA IN THE INSECTA.

Collembola or Springtails, having appeared under many different headings in various systems of classification, have been included in the Insecta by reason of the fact that they possess three pairs of legs, have mouthparts similar in arrangement to that of typical insects and that they are opisthogoneate, i.e., have the genital opening at the posterior end of the abdomen. However, they also have characters not found in other insects, namely, the absence of Malpighian tubes, the peculiar method of excretion and the presence of a post-antennal organ. So far no definite conclusions seem to have been reached, but a view which

seems acceptable is that they are an off shoot of the main evolutionary line more ancient than that of recognised insects. A suggestion has been put forward (Imms, 1936) that to illustrate clearly the evolutionary lines of the Orders now embraced under Sub-class I. the Orders should be raised to Sub-classes for which the following names are proposed: Oligoentomata or Collembola, Myrientomata or Protura, and Euentomata, or Thysanura, and Pterygota. This must be regarded as provisional since it has not yet been generally adopted by authors.

SUB-ORDERS.

The Springtails present, morphologically, two distinct forms, the elongate Arthropleona (Pl. v, fig. 1) in which the thorax and abdomen are distinctly segmented (excepting the posterior segments of some species) and the globular species Symphypleona (Pl. v, fig. 4), in which ankylosis or fusion of the segments is complete, only segments V and VI being distinct.

DISTRIBUTION.

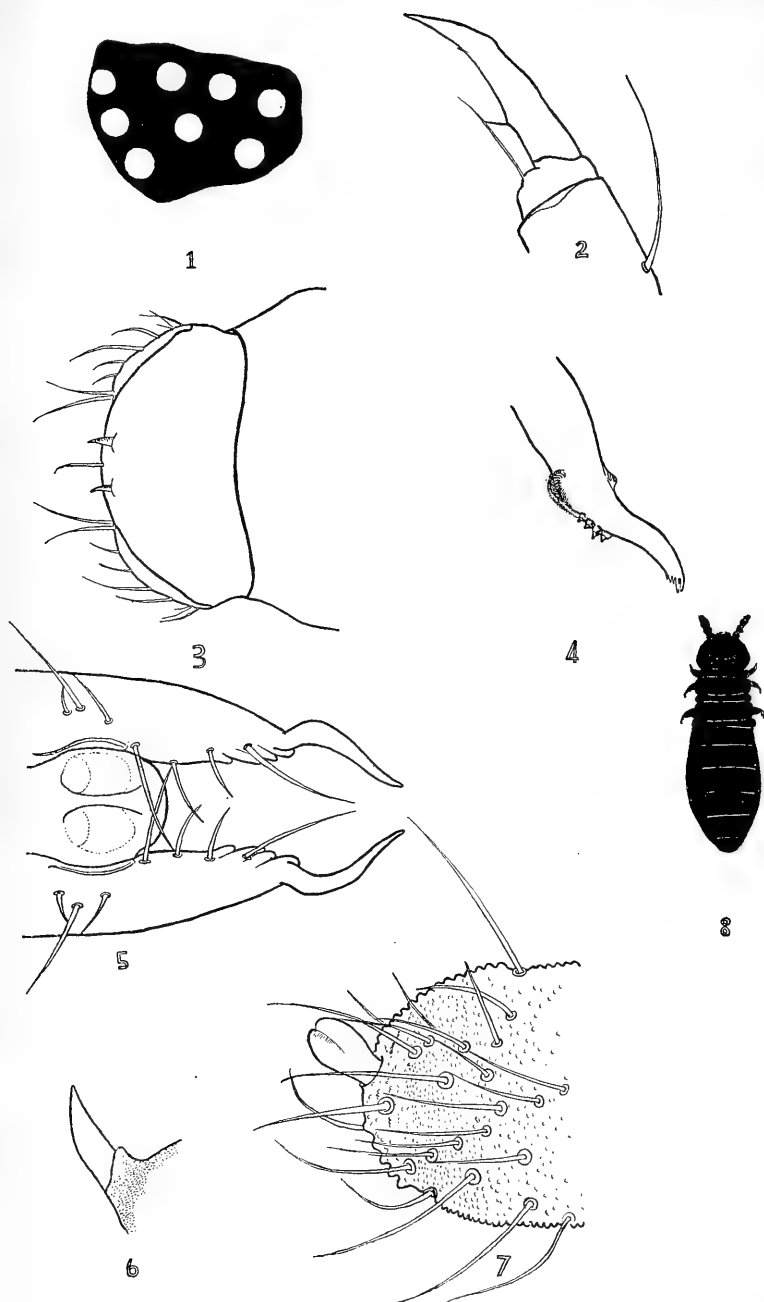
Since remains of Collembola are among the earliest known fossils, extending from the Middle Devonian period, one has difficulty in deciding whether a species is an introduction or a remnant of a past extensive distribution before water divided the land masses as we know them to-day. Whichever may be the case a large number of species are found to survive in extremes of temperature in widely separated countries. A generalisation can be made that Collembola are world-wide in distribution, only very dry areas being unfavourable.

ANATOMY.

The exoskeleton of these animals is soft, the cuticle being smooth or granular, and is more constant in thickness than that of most other insects. The head varies considerably in shape from ovoid to angular forms. Situated antero-laterally on the head are the antennae, usually four segmented, though in some species the apical segment may be further subdivided.

Behind the antennae are the eyes (except in blind forms), which are of the simple type, but those of the eucone type have been described as occurring in a great number of Collembola. These eyes vary in number, usually about five, but not more than eight, on each side, surrounded very often by a heavily pigmented area. (Pl. vi, fig. 1.) Between the eye and the antenna is situated (when present) the post-antennal-organ, one on each side, composed of sense cells forming elliptical or rosette-like patterns. Situated ventrally is the mouth deeply inset within the head capsule. The thorax is composed of three segments, known as the pro-, meso- and meta-thorax, each of which carries a pair of six-jointed legs ending in a strong claw which is usually accompanied by a smaller one, the empodium (Pl. vii, B3), but this may be vestigial or absent.

The abdomen consists of six segments which are sometimes fused and ill-defined.



COLLEMBOLA.

On the first abdominal segment is the ventral tube. Ventrally on the third is a pair of smaller appendages fused at the base known as the retinaculum or catch; the base is termed the corpus, while the distal portions are the rami.

The fourth segment bears the spring (Pl. vi, fig. 5) (when present) from which is derived the popular name of "Springtail." The basal portion is fused, forming the manubrium, and attached to this are the paired dentes which end in a claw-like process, the mucro (Pl. vii, figs. 1, 2, 3).

The normal position of the spring is against the body, held by the retinaculum, and when released the spring strikes the ground, causing the Collembolan to leap forward through the air sometimes a considerable distance. Segment V of the abdomen provides the genital opening, segment VI the anus. The body is clothed with hairs of varying kinds while some genera possess scales.

EYES.

In *Anurida maritima* Lab. (Imms, 1906) the lens is convex and is invested by the surrounding cuticle; in life they appear as five glistening points. Underlying the lens are four cells, part of and continuous with the hypodermis, which contain clear protoplasm and secrete the lens and are called lentigen cells. Internally to the lentigen cells are four large cells which are deeply pigmented and form the retina which is in continuance with the branch of the optic nerve serving that eye. The branches unite to form the main optic nerve.

The eyes among the Poduridae have lost the crystalline cone cells and are of a very simple type, but those of the eucone type have been described as occurring in the majority of Collembola (Imms, 1942: 4 *General Textbook of Entomology*, p. 79), e.g. Mydoniidae (Entomobryidae), Sminthuridae and some of the Achorutidae.

POST-ANTENNAL ORGAN.

This organ (Imms, 1906) is composed of bodies which appear to be large hollowed-out extensions of the cuticle containing slightly pigmented protoplasm. These bodies are mounted on small stalks and arranged round a common centre, each organ being supplied with a nerve.

MOUTHPARTS.

The mouthparts are deeply inset within the head capsule, a character not found in typical insects. When feeding the mouthparts are projected.

In a dorsal view of *Anurida* (Imms, 1906) one sees the clypeus and the side folds of the head partly enclosing the labrum.

Ventrally at the anterior portion of the head is the labium or second maxillae, forming practically the whole of the ventral region of the head, the distal portion being in two halves meeting at the mid-ventral line. Enclosed between the labrum and labium are the mandibles, long

hollow structures flattened and broad at the apices (Pl. vi, fig. 4); usually there is one more tooth on the left mandible than on the right to allow the interlocking of the teeth. In vegetable feeders there is a molar plate, which is many-ridged and used for grinding the plant tissues. In carnivorous species, except *Isotoma sepulcralis* Flsm., this molar plate is absent.

Between the mandibles and the first maxillae are the plate-like maxillulae, sometimes referred to as the paraglossae, against which the lingua or tongue is pressed. On each side of the lingua is the first maxilla, articulated with the stipes, cardo and lingual stalk of its respective side. The head of the maxilla is in three parts, the uppermost of them being the modified palp; following this is the strong galea, and lastly the lacinia, which is more deeply serrated than the maxillary palp.

Slight deviation in the construction of the cardo, stipes and lingual stalk, also the presence of a palpifer, appear in *Orchesella*. In some species (*Neanura*) the mandibles are styliform and used for sucking plant juices.

CLAWS.

The claws of Springtails are not paired in exactly the same way as those of insects (Pl. vii B, fig. 2), instead they form a kind of cup, the superior edges of the broad curved claws being together at an angle so that the inferior or innermost edges are separated. In most species there is a pair of smaller claws called the empodium, which is situated between the separated inferior edges of the large claws.

In some species the empodium is absent.

The claws vary in length and breadth as well as in the number of inner teeth when present (Pl. vi, fig. 2), sometimes lateral teeth being present on the superior edge of the claw.

In certain species, of which *Sminthurus viridis* (L.) is a good example, the claw has a well-developed membranous sheath or tunica.

The empodium is sometimes elongate and produced to a fine bristle-like point which is often curved round (Pl. vii B, fig. 1), or maybe broad with a wide angular inner lamella and short apical bristle, but sometimes the bristle is wanting (Pl. vii B, fig. 4).

VENTRAL TUBE.

The function of this organ is a much debated point, some holding the opinion that it was the external genitalia, but this was refuted and a theory put forward that its purpose was to absorb moisture, without which these creatures quickly die. Then came a suggestion that it absorbed the shock of impact when the creature landed after leaping, but since some species in which the spring is wanting have a ventral tube, this does not make a satisfactory answer to the problem. However, in *Sminthurus*, observation by Lubbock (1873) revealed that it was used when climbing on smooth surfaces—the filaments are extruded and emit a drop of liquid and so the creature obtains anchorage.

Some *Podura (Tomocerus) longicornis* Müll. were enclosed in a glass dish. With the aid of a microscope one could easily observe the function of the ventral tube as the specimens moved about upside down on the lid.

When stationary the ventral tube is perpendicular and in contact with the surface. On the insect walking forward the ventral tube is bent backwards, the adhesion still being maintained until it is forcibly pulled away when the folds in the integument of the fully extruded organ are seen. On being completely torn away from the surface the tube flicks back into its original position, immediately making contact again with the surface. This action is repeated so long as the specimen is moving about. Occasionally specimens remain stationary with ventral tube completely retracted, but they are more often to be found hanging on by it. The claws are turned inward when the specimen is standing. The extrusible organ, being filled with blood, appears transparent and the cavity of the tube can be seen through it. The integument of the extruded organ appears to glisten with moisture, but whether this is really so or just due to the smoothness and transparency of the organ is difficult to ascertain.

The filaments are extruded by blood pressure and completely retracted within the tube itself by muscles.

HAIRS AND SPINES.

There are four main types of hairs. On the tibio-tarsi of many species are clavate and spatulate forms, while simple curved types are found on the anal segments; short thick olfactory hairs, rounded at the apex, are found on the antennae of some species.

Greater variety is found in the setae, of which there are about eight forms. Strong pointed serrated forms, some only partly serrate from the base, long thin types bent at the tip are seen on the apex of the antennae (Pl. vi, fig. 7). Some species are clothed in long, strong, broadly fimbriated setae, others in setae of ciliated types occasionally apically brushlike, while still others are clothed with beautiful scale-like setae.

A cluster of very curious short, strong, apically broadened and ciliated setae of a sensory nature are found on the male antennae of *Isotomurus echidnus* Wom., an inhabitant of S. Australia.

Spines are present on the anal segments, of which a typical example is found in *Protaphorura (Onychiurus) armata* (Tbg.). These spines are slightly curved and raised on papillae (Pl. vi, fig. 6). These are called anal horns (Pl. vi, fig. 3).

Simple spines, also raised on papillae, occur on the dentes of *Proisotomurus papillatus* Wom., only found so far in Australia, but tridentate spines are to be found on *Podura (Tomocerus) minor* (Lubb.), a very common British species.

Two types of sensory clubs are found on the antennae of the blind Onychiuridae, those of the smooth or tuberculate type not curved to-

wards one another being characteristic of the Onychiurinae, while the smooth type curved towards each other are characteristic of the Tullberginae. Rather interesting organs are the sensory rods, finger-like processes curved towards each other, also found on the antennae.

RESPIRATORY SYSTEM.

The respiratory system in *Smynthurus viridis* has been studied in some detail by Davies (1927) on which the following account is based.

In the majority of Collembolan species respiration is cutaneous, but in *Smynthurus*, *Sminthurides*, *Actaletes*, *Allacma* and *Sphyrotheca* tracheae are present, and are best developed in *Smynthurus*. It is interesting that there is no anastomosis, there being two separate systems, one supplying each side of the body.

Simple spiracular openings are to be seen between the head and prothorax. No intersegment between the head and prothorax is to be found so it is presumed that the cervicum is wanting, this being based on the fact that the mandibular muscles at the base of the head are in front of the spiracular opening, while the cervical muscles originate between the head and the prothorax leading into a short canal which passes slightly ventrally into the cavity of the spiracle, which is more or less longitudinal in position.

The cephalic bundles of tracheae are very near the posterior border of the head but the spiracle, excluding the extension of the cavity, is in the prothoracic segment and not the cephalic region.

In structure the spiracle is of the simplest type, being merely an invagination or tube ending in a bulb or atrium, irregular in shape due to the openings into the very large "trunks" leading from it. The diameter of the spiracular orifice in the adult insect is 5μ , while the length of the canal from opening to atrium is 20μ .

The total length of the spiracle is $50-60\mu$, lined by an extension of the cuticle inwards overlying the epithelial cells.

This simple type of spiracle bears close resemblance to that found in *Peripatus*. No muscular control of this organ has so far been found.

The tracheae when filled with air are of silvery appearance which facilitates a detailed study of them. Commencing with the spiracular opening a short canal leads into the atrium, from which branch trunks forming bundles of tracheae serving the ventral, median, and dorsal regions of the head. Along their courses they branch off into smaller vessels, ending in a single trachea. Here it is interesting to note that from each spiracle, behind the exit of the cephalic bundles, a branch leads out across the prothorax to supply the prothoracic leg of the opposite side of the body to which the spiracle is situated. The crossing of these branches occurs mid-ventrally.

Another small bundle leaves the spiracle postero-ventrally to pass along its respective side of the thorax, branching off to feed the meso and meta-thoracic legs, before going to the ventral region of the abdomen, anus and furca.

No tracheoles lead into the ventral tube, and so they play no part in the function of this organ.

Four main bunches of tracheae lead from each spiracle to supply the abdomen, the smallest passing to the antero-dorsal region, while the largest traverses the region of the alimentary canal.

The two other bundles pass ventrally, branching into the nervous and reproductive systems.

NERVOUS SYSTEM.

In *Aphorura* (Hilton, 1913) there are two large ganglia in the head. Protruding from the supra-oesophageal ganglion are antennal lobes from which nerves connect with the antennae, one on each side. Two smaller nerves, one on each side, connect with the cells of the post-antennal organ. There is also a labral nerve of smaller size, connected with the post-antennal sense cells on both sides.

The sub-oesophageal ganglion is connected with the supra-oesophageal ganglion and from the sides of the former there are three main nerve trunks as follows:—mandibular, maxillary and labial branches, as found in other insects.

There are three main thoracic ganglia, one for each segment, ending finally in a mass of nervous tissue in the upper abdominal region made up of several centres fused together.

MUSCULAR SYSTEM.

This system, excluding the appendages, has been broadly divided into three (Imms, 1906). Firstly a series of longitudinal tergal muscles, arranged in two sets, an inner and outer, on each side of the dorsal vessel in each segment. Secondly, ventrally there is a system of longitudinal sternal muscles. Thirdly, muscles passing vertically and obliquely from the tergum to the sternum, or tergo-sternal muscles. Muscles are attached to the antennae, legs and spring and a very complex system serves the mouth parts; in *Anurida* more than twenty pairs have been made out. As one would expect, the largest muscles are connected with the spring, and nine have been found in *Smynthurus* (Lubbock, 1873).

DIGESTIVE SYSTEM.

The digestive system (Imms, 1906) is simple, comprising three well-defined regions, the fore-gut, mid-gut, or stomach, and hind-gut.

Generally speaking, the mid-gut is sausage-shaped with appendages at each extremity. The fore-gut is approximately twice as long as the hind-gut and the whole system superficially follows a straight course from mouth to anus.

The fore-gut consists of two compartments, the pharynx and the oesophagus, the former being a large cavity formed by the mouth parts.

The oesophagus is a narrow tube, constant in diameter throughout its length, which leads into the mid-gut, into which it projects slightly.

The wall of the fore-gut is formed of three layers of tissue, the innermost being chitinous secreted by the middle layer, which is the epithelium, and the third and outermost layer is of muscular tissue.

The mid-gut has a lining of endo-epithelium and is covered by two layers of muscular tissue.

It is believed that the cells of the stomach lining are regenerated, the moulted cells being removed with each ecdysis.

The hind-gut, which is slightly dilated in the form of a chamber, occupies approximately the last two abdominal segments, the inner walls are lined with chitinous cuticle and followed by an epithelial layer which is covered by rectal and anal muscles.

CEPHALIC GLANDS and ventral groove of *Anurida* (Imms, 1906).

The cephalic or salivary glands are situated one on each side in the posterior region of the head, ducts of each gland converging to open on to the lingua.

The acinose glands of the anterior portion of the head have ducts which join those of the tubular glands in a common chamber, which opens into the ventral groove, where the secretions flow down to the ventral tube, serving to moisten it.

DORSAL VESSEL or heart (Imms, 1906).

This organ is a narrow tube divided into six chambers, with paired lateral ostia and alary muscles at each of the constrictions and is situated under the integument in the median dorsal line of the body.

Commencing in the head is the peri-oesophageal aorta, which in *Anurida* forms a tube or cylinder round the fore-intestine, leaving it when it joins the mid-gut, following a line directly above the latter and reaching as far as the fourth abdominal segment.

Blood is present throughout the body cavity and in *Anurida* the corpuscles are circular in outline and have a conspicuous nucleus.

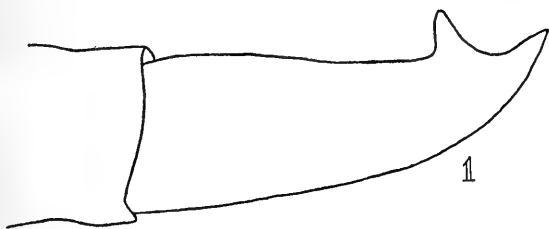
Occasionally the cells give out pseudopodia in amoebic fashion.

REPRODUCTIVE SYSTEM.

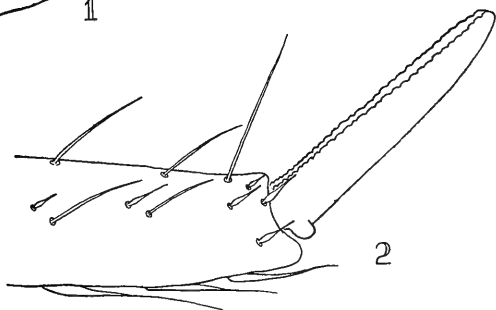
The Collembola do not possess external genitalia and to determine the sex of individual specimens is difficult when female genital appendages are absent. These appendages are in the form of hairs and spines of a special kind on the posterior segments. The male is characterised in certain species of *Sminthurides* by a modification of the antennae.

Internally in the male (Imms, 1906) the testes extend practically the entire length of the body, the opening being a canal which divides into ducts connecting the testes. The testes are carrot-shaped glands running each side of the gut, tapering to a fine filamentous end which is attached to the excretory tissue in the mesothoracic segment.

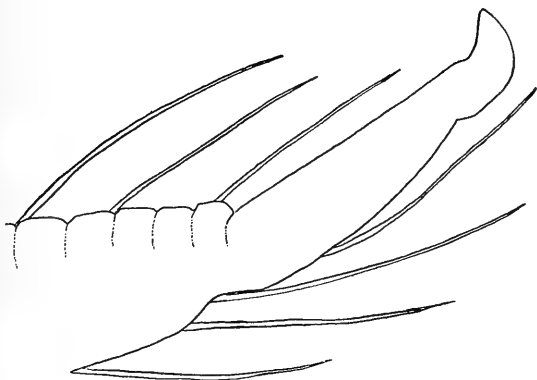
The median diverticulum of the female branches off the vagina and divides into short oviducts connecting the ovaries, which are of the same general shape as the male testes, but are broader and taper more quickly.



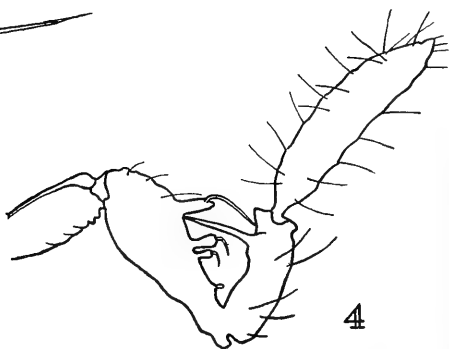
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Females have been found to lay eggs before the last ecdysis has taken place.

COPULATION.

That the Collembola do not possess external genitalia may account for the fact that copulation does not appear to have been observed. Wigglesworth (1939) states that the sperm is introduced into the female genital opening by the mouth parts. This habit, it is interesting to note, belongs also to the Spiders. Males of certain species of *Sminthurides* have somewhat pincer-like antennae (Pl. vii A, fig. 4), while slightly larger specimens not exhibiting this specialisation are females. According to Reuter (1880) the male seizes with his antennae the antennae of the female and by means of the specialisation holds her securely. The male is then thrown over the head of the female so that they are resting back to back and in this position have been seen to jump about the water surface for as long as three days. I have personally only seen them locked by their antennae face to face.

It seems quite logical that somehow in this position they *do* mate, and as no one has seen this the operation is perhaps of short duration. I do not think that the development of the male antennae and the method in which these modifications are used can be for any other purpose than that of mating. On the other hand, it is strange that other globular species which one would think needed a similar form of antennal development for mating purposes seem to be without any such modifications.

A great deal more requires to be done before any definite statement can be made concerning this matter.

EGGS AND EMBRYOLOGY.

The eggs are laid in clusters and are usually spherical, smooth, glistening, yellow, rather like droplets of liquid; they become deeper in colour as development takes place, and some forms which are hairy have been recorded. The egg of *Anurida* (Imms, 1906) is .30 mm. in diameter, and deposited in groups of between 20-30.

The female of *Sminthurus viridis* ingests soil which is excreted over the eggs, forming a hard coat which camouflages them very effectively and protects them from the weather.

They are thus able to stand extremes of temperature in Palaearctic and Australian Regions where this species occurs.

The eggs of Collembola contain a small quantity of yolk, and divide by entire cleavage, a link with some Crustacea and Arachnida. Eggs of several genera that have so far been examined show that after the blastodermic cuticle has formed, a change in the cells takes place at the upper pole of the egg, giving rise to filamentous growths which extend over half-way down the egg, forming a dorsal organ (Tiegs 1942) similar to that of *Symphyla*.

The newly-emerged springtail is white except for the eyes, which are surrounded by dark pigment, and only after exposure to the light for some time is the full intensity of colour attained. They pass through numerous instars and except in size and colour the young springtail resembles the adult. Hundreds of cast skins are often found when lifting bark exposing large colonies.

The temperature and the pH of the soil has been found to influence the egg laying of *Smynturus viridis* (Davidson, 1932B).

LIFE-HISTORY.

Little has been done concerning the life-history of Collembola but that of two species of economic importance is worth recording, namely, *Smynturus viridis* and *Achorutes viaticus* (Tbg.) (Pl. vi, fig. 8). Davies (1928A) mentions that a female *S. viridis*, when not disturbed, deposits her eggs in batches of 20-30, each egg having an average diameter at the time of being laid of 0.25 mm. Maintained in a damp atmosphere at 15° C. the eggs increased in size to 0.27 mm. in diameter. Twenty to twenty-five days after being laid the eyes and antennae were visible, under the conditions mentioned hatching took place in 35-40 days, when the newly-emerged springtail measured 0.4 mm. in length. In eight to ten weeks, according to atmospheric conditions, *S. viridis* attains maturity; no mating or indication of moulting was ever observed. The resistance of the eggs of *S. viridis* to drought has been proved by Davidson (1932A) to be due to lack of moisture, and not to rhythmical diapause.

The life-history of *Achorutes viaticus* has been recorded by W. H. Parkinson and H. D. Bell (1919). Kept in Petri dishes and reared during the summer, eggs of 0.25 mm. in diameter, smooth, shiny, and spherical, were laid either singly or in groups of seven or eight. As the embryos developed the eggs became more elongate, and after about the 23rd day the eye spots were visible. Hatching took place on about the 28th day, when the insects within a few hours were capable of walking and jumping. M. Davies (1928B), in his paper on "The Effect of Relative Humidity on Certain Species of Collembola," found that at 25° C. saturated conditions were essential for the survival of Collembola used in his experiments.

LUMINOSITY.

About six species belonging to four genera have so far been recorded as luminous.

Anurida (Barber, 1913) emits a continuous pale greenish-yellow glow, not strong enough to make the legs and antennae visible, but sufficient for anyone to detect its presence in the field. *Anurida* continued to glow for three nights in a tube before it died.

No particular luminous organs have yet been discovered, the glow being general throughout the body. It has been suggested that urate concretions of the fat body possibly act as the reflector layer (Imms, 1906).

Neanura quadrioculata Guthrie is different in its behaviour (Barber, 1913), emitting flashes of light lasting perhaps between one-fifth and one-half second, repeating after about 20 seconds.

Neanura muscorum (Temp.) (Pl. v, fig. 3) (Molesch, 1904) when stimulated by shaking produced flashes lasting from several seconds to half-a-minute.

Some workers attribute the luminosity to the possible eating of luminous bacteria and fungi, which, however, must be ruled out in those species in which the light is flashed.

THE FOOD OF COLLEMBOLA.

Springtails feed on lichens, moulds and algae of a minute type, also spores and mycelium have often been found in their stomachs. Macnamara (1924) has seen *Achorutes* (*Hypogastrura*) *nivicola* (Fitch) = *socialis* Uzel in large numbers imbibing the sweet sap exuding from freshly cut maple stumps. *Isotomurus palustris* (Müll.) and *Sminthurus aquaticus* (Bourl.), which live on the water surface, feed on diatoms and desmids. In the spring they feed largely on pollen from conifers. The littoral *Anurida maritima* (Imms, 1906) is undoubtedly carnivorous, feeding on the soft tissues of dead molluscs, fish and crustacea. Vegetable food also has been found in the form of Desmids and other green algae.

Achorutes viaticus feeds on *Psychoda* larvae, *Zoogloea* masses, developing fungal hyphae and debris which has been retained from sewage, and have been observed congregating round a dead worm. In the laboratory they fed on grass which was in the process of decomposition although still green, and which was limp and adhering to the sides of the glass bowl in which they were kept. Healthy blades were untouched.

Sminthurus viridis is phytophagous, being particularly partial to clover, grass, lucerne, as well as seedlings of wheat and oats.

Orchesella villosa (L.), kept in the laboratory, fed on the tips of moss, the only vegetation placed in the vessel. The moss, after being attacked, turned yellowish in colour. Cannibalism among Collembola occurs when numbers gathered together exhaust the food supply. When collecting large numbers in a small phial, remains of specimens partly devoured are often seen when the capture is being sorted out.

To summarise, it can be said that vegetable matter, whether decomposing or healthy, and plant juices form a large part of their diet. Some species favour dead animal tissue.

ENEMIES.

Little field observation has been made on Collembola and consequently records of insects found preying on them are few and far between.

Spiders seem to be the chief enemies. Bristowe (1941) records that Linyphiidae when living in such places as caves, mountain summits, the seashore, and filter beds rely almost entirely on Collembola for food.

Experiments have been carried out with species of *Hydropodura* and *Achorutes*, which Linyphiidae and young *Lycosae* have accepted. *Leptyphantes*, *Drassodes*, *Clubiona*, *Linyphia*, *Aranea*, *Lycosa* and *Xysticus* have accepted Isotomidae, while species of *Smynthurus* have fallen prey to *Linyphia*, *Aranea*, *Lycosa* and *Xysticus*. In the laboratory the Phalangid *Platybunus triangularis* (Herbst) accepted *Orchesella cincta* (L.), and *Podura longicornis*. I have also seen in the field a species of Myriopod *Lithobius* with *Orchesella* species in its jaws. The littoral pseudoscorpion *Obisium maritimum* Leach, probably preys on *Anurida* (Imms, 1905). Coleoptera and Hemiptera have occasionally been seen with springtail prey, also a solitary wasp was found to have packed into its tunnel a number of Entomobryids (J. G. Myers, 1934). A snout mite, *Biscirus lapidarius* Kramer, feeds on *S. viridis* and is used for control purposes in Australia (Womersley, 1933). Gamasidae have been seen to feed on springtails in a warehouse at Slough.

There are almost certainly many more predators than these mentioned, particularly the larvae of many orders of insects, also birds.

Although a lot of work remains to be done on the subject, evidence points to the fact that Collembola play a very important part in the decomposition of forest litter and, with the increasing interest being shown by economic and ecological students, fields of great interest are being investigated.

PARASITES.

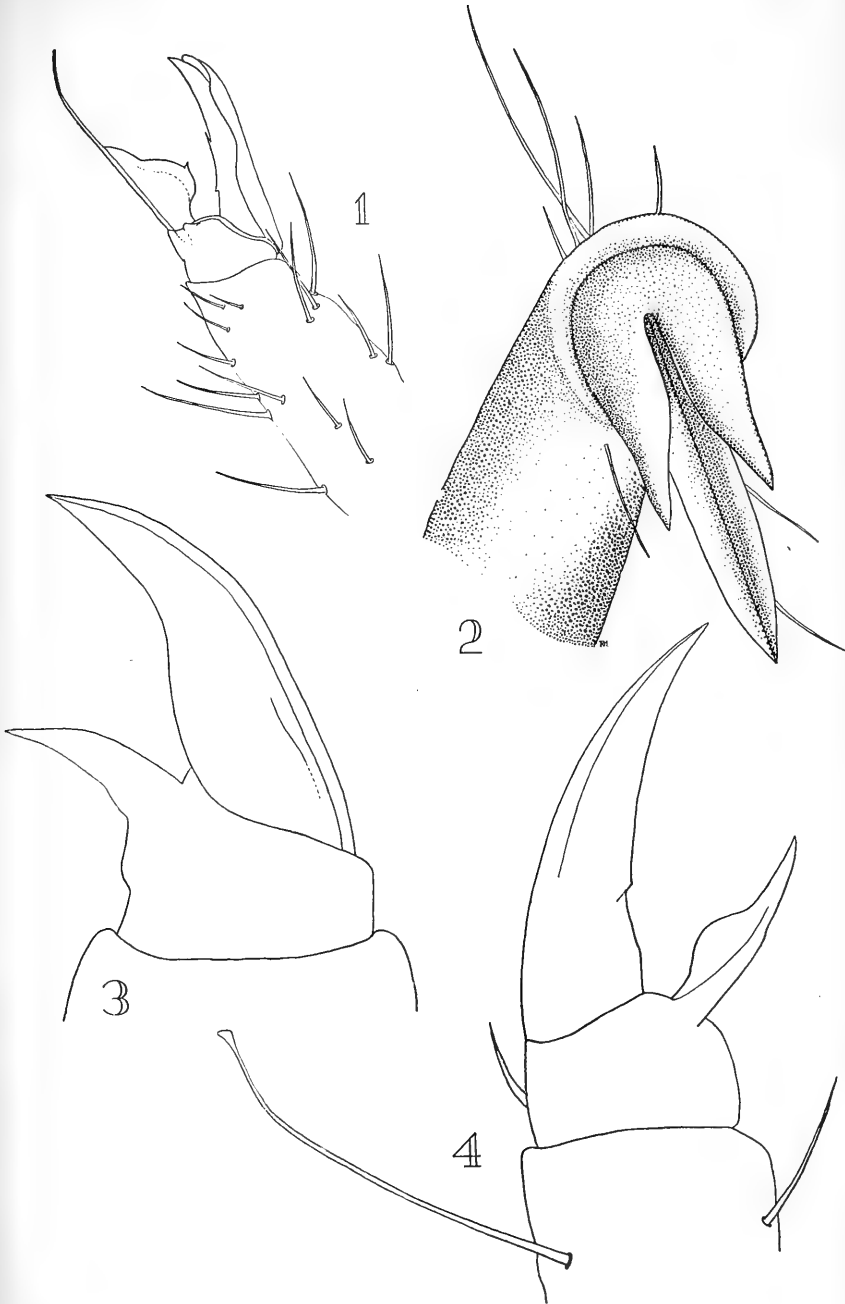
There are so far no records of any Hymenopterous parasites of this order, possibly partly due to the fact that those species which are not active live in situations not readily accessible to them.

The large species living more or less in the open are all strong jumpers and are not readily accessible to attacks by parasites. Egg parasites are also unknown.

Two species of Parasitic Sporozoa have been found. Minchin (1903) records *Gregarina podurae* (Leyer) from the gut of *Orchesella villosa* and *Glugea thysanurae* (L. Pfr.) from the gonads of *H. aquatica* L. Nematodes were observed in the gonads of *Anurida* (Imms, 1906) and Macnamara (1924) once found them in the mid-gut of *Entomobrya hexfasciata* Harvey. Phillips (1946) records larval Nematodes from the mesothorax of *Neanura grassei* (Denis).

HABITATS.

Generally speaking, Collembola are nearly always to be found in damp situations where there is an abundance of vegetable matter both living and in a state of decomposition. Some species, however, have adapted themselves to certain favourable habitats where humidity is always high, and where there is a plentiful supply of food, as on the



COLLEMBOLA.

surface of pools. There are five aquatic British species, which are found on the surface of freshwater pools (Brown, 1929), about 8 littoral, and two marine species living on the seashore, retiring to rock crevices when the tide comes in.

A warm humid spell such as often occurs during the early months of the year is most favourable to springtails, when log and stone turning usually exposes hundreds of specimens.

Also at this time of the year one notices the large numbers of *Dicyrtomina minuta* O. Fab. var. *coulonii* (Nic.), a very pretty insect found on lichen-covered sticks, particularly birch, which are strewn about under the trees.

Achorutes (*Hypogastrura*) *nivicola*, the snow flea, as its name implies, is found on snow, sometimes in such large numbers that the snow appears to be discoloured. A species not uncommon in houses is the beautiful scaled *Pseudosira domestica* (Nic.). (Pl. v, fig. 2.)

Springtails have also been found associating with ants and termites, and quite recent collections made in our caves have added a number of cavernicolous species.

ECONOMIC.

I have references to thirty-three British species of Collembola found damaging plants, and a few mentioned in the following list will give an indication of the plants and the parts which are damaged.

Achorutes (*Hypogastrura*) *armatus* (Nic.) attacking mushroom beds, also roots of plants, bulbs, and seedlings, and has been found occasionally damaging lawns.

A. (H.) manubrialis Tbg., *A. (H.) rufescens* Nic. and *Xenylla humicola* (O. Fab.) have also been found damaging mushrooms.

X. grisea Axels, *Friesia mirabilis* (Tbg.) attack bulbs.

Onychiurus ambulans (L.) rootlets of plants, seeds and bulbs.

Protaphorura (O.) *armata* (Tbg.) rootlets of seedlings, ferns, sugar cane and bulbs.

O. fimetarius (L.) rootlets of carrots, potatoes and sugar cane.

Approximately seventy species have been found damaging plants to some lesser extent, but not sufficiently enough to necessitate the employment of vigorous control measures.

There are only two species which are regarded as being of any agricultural importance, namely *Bourletiella* (*Smynturus*) *signata* (Nic.) = *hortensis* (Fitch.) and *Smynturus viridis*.

B. signata (Smith, 1931) attacks mangolds and beet seedlings for the most part, and occasionally sugar beet, potatoes, soya beans, radishes and peas. It feeds on the stems just above ground level, giving the plant a constricted appearance. In mangolds this is known as "Black leg."

This species has been recorded from widely separated counties in the British Isles.

S. viridis plays havoc with various grasses, and particularly clover. Womersley (1933) states that near Adelaide, Australia, the estimated population density approached 150,000,000 per acre.

SWARMING. Brown 1921, Turk 1932, Davies 1932.

This phenomenon has been observed in naturally gregarious species. When the food supply is abundant but of a limited extent rapid breeding takes place, causing a considerable increase in the population. Eventually the food supply is diminished to such a degree that under these conditions the Collembola become carnivorous or sometimes cannibalistic. Species naturally phytophagous have been seen consuming the dead of their own species. This change of habit explains why large numbers can survive in barren situations for quite a long period.

Atracheate species congregate in situations where the humidity is high, as on the surface water. Species which over-winter in the egg stage respond to rises of temperature and humidity, causing a mass emergence and a sudden appearance of large numbers. C. Elton (1927) records how in Switzerland owing to springtails the wheels of a railway engine slipped on the lines.

FOSSIL COLLEMBOLA (R. J. Tillyard, 1928).

Three fossil head capsules of Collemboloid type were found in small flakes of Rhynie Chert from Old Red Sandstone in Scotland in 1926.

These capsules present Podurid characters and possibly are the prototype of the Collembola as we know them to-day. The mandibles distinctly show a molar area, are retracted within the head capsule which, as mentioned elsewhere, is a character not found in the true insects. The antennae, one of which is complete, is four segmented and of typical Podurid form. Unfortunately, we have no indication of the number of segments or even of the general outline of the abdomen to which these head capsules belong. Assuming, however, that they were in keeping with the Podurid theory then it seems likely that, by sheer numbers of individuals and the fact that parasites and enemies have only very limited control, springtails have survived to the present day, the lack of evolutionary change being due to the fact that natural conditions of temperature and humidity have largely favoured them wherever they have occurred and by their general habitat they meet with little opposition. No other Collemboloid remains have been found in Devonian strata and the earliest Pterygote insect remains have occurred in the lower beds of the Upper Carboniferous. Several springtails have been described from collections in amber.

COLLECTING.

The usual method of collecting these minute insects that one sees recommended in papers dealing with the subject requires little apparatus, only a tube of preservative and a camel hair brush. The brush is either moistened with spirit or by the mouth before being brought in

contact with the specimen. For small species devoid of a spring this is undoubtedly the best method. Quite often more than one attempt is required before some of the more active species are finally caught. To overcome this difficulty moistening the brush with chloroform or glycerine has been recommended. However, I have found that an aspirator, "pooter," or sucking tube is more convenient for these active species, and is easily constructed from glass tubing, a convenient size being the length and diameter of one's little finger. To each end of this is fitted corks which are bored to allow a piece of smaller diameter glass tubing (3 ins. long) to be pushed through one cork for about an inch, the external end of this being tapered slightly to concentrate the area of suction. Into the other cork is pushed a similar length of tubing so that it does not project through the cork. Over this end and attached to the cork is a piece of gauze or bolting silk of the finest gauge. To the other end of this tubing attach a piece of rubber tubing fitted if desired with a mouthpiece. A glass bulb can be installed somewhere along this tubing connecting the cylinder with the mouthpiece, which is lightly packed with cotton wool to prevent the entrance of dust into the mouth when in use.

If one buys a foot or so of this $\frac{1}{2}$ -inch diameter glass tubing a number of cylinders can be made. When one has a cylinder containing a sufficient number of specimens, or a particular species, by removal of the attachments and replacing them quickly with corks it can be labelled and placed in the collecting box and a fresh one attached.

Unfortunately, scaled species are damaged by this method of collecting or by even being kept in a confined space for a few minutes. To collect perfect specimens some small tubes should be carried; in the bottom of each should be a slip of paper containing a drop of ethyl acetate or chloroform. When a capture is to be made uncork the tube and place it quickly over the specimen, which after a few seconds will have ceased to move and may be picked up on the end of a brush, preferably by the ventral surface, and transferred to a tube of spirit. A square of waterproof canvas is very useful for kneeling and should always be carried when collecting.

A method recommended for the collection of aquatic species is to sprinkle a few drops of chloroform on to the water surface when the specimens can be picked up with a brush. I have found it easier to take to the waterside a ladle and a flat bottomed meat tin, the inside of which has been painted white. Taking a ladle or two of the surface water, place it gently into the tin, which is propped up so that the water collects at one side when the springtails will jump on to the remaining dry elevated portion of the tray bottom, from which they can be collected by means of the aspirator.

The placing of small tents (Folsom, 1915) round the edges of ponds has apparently proved attractive to aquatic species which "came in immense numbers."

For those who for one reason or another prefer to collect sitting in an easy chair at home, some strong paper bags (sugar bags are ideal), into which samples of humus, moss, old birds' nests, and flood rubbish containing springtails can be carried home and sorted out at leisure on a table, are an essential.

When time is valuable and cannot be spent poring over debris, a Berlese Funnel will do it for you.

This apparatus consists of a water-jacketed funnel which is heated (in warm climates this is not necessary) by a gas ring. At the end of the funnel is placed a tube containing spirit; resting on top of the funnel is a sieve or wire tray supporting the debris. The springtails, being stimulated by the warmth and drying of the debris, leave it and fall into the funnel, and unable to gain a foothold on its smooth surface are precipitated into the tube of preservative. The secret of this method is not to have too thick a layer of debris on the sieve.

PRESERVATION.

Springtails, owing to the softness of their integument, cannot be mounted dry on cardboard points, but are preferably stored in tubes of alcohol plugged with cotton wool. These tubes are inverted in ground-glass-stoppered jars and covered with spirit. Various strengths can be used; 75% has proved very efficient but 80-85% has been recommended, higher concentrations tending to render the material brittle.

For those who cannot obtain alcohol, 4% formalin is a good preservative, which at the same time does not affect certain colours as does alcohol. Methylated spirit has not proved very satisfactory. Data should be written in Indian ink and included with the specimens.

A type collection of specimens mounted as slides for the microscope is very useful for reference and other purposes. Owing to the high refractive index of other media Berlese Medium or Gum Chloral is the only suitable (but semi-permanent) mountant, of which the following is the formula. De Faure's or Berlese's Media:—Chloral hydrate, 20 gms.; gum arabic, 12 grms.; distilled water sufficient to dissolve the gum; glucose syrup, one teaspoonful; acetic acid, glacial, 10 c.c. Dissolve the gum with heat then add Chloral hydrate and other constituents and filter hot through fine muslin. This is to be used with the finest number coverslips and slides. It is always advisable to make a series of slides of each subject to allow for failures. While drying at a moderate temperature they must be observed for a few days so that if necessary a little extra medium may be added. If the medium is of the correct consistency, when dry, and the cover-glass ringed with gold size or black japan, the preparation will be good for some years. Some workers heat their slides until the medium bubbles at the edges, but this I find sometimes disturbs the position of the object and occasionally crystals form after some time. From my experience of preparations treated in this way, a large percentage occurred in which the

medium later contracted under the cover slip, in spite of ringing in the usual manner.

EXPLANATION OF PLATES.

PLATE V.

- Fig. 1. *Orchesella flavescens* (Bourl.) var. *melanocephala* Nic.
 Fig. 2. *Pseudosira domestica* (Nic.).
 Fig. 3. *Neanura muscorum* (Temp.).
 Fig. 4. *Sminthurides aquaticus* (Bourl.).

Figs. 1 and 2. Photo by E. E. Syms.

Figs. 3 and 4. Photo by E. Ridley.

PLATE VI.

Achorutes viaticus (Tbg.).

- Fig. 1. Ocelli.
 Fig. 2. Claw and tip of tibiotarsus.
 Fig. 3. Anal segment and horns.
 Fig. 4. Mandible.
 Fig. 5. Furca and retinaculum. (Ventral view.)
 Fig. 6. Anal horn.
 Fig. 7. Apex of Antenna IV.
 Fig. 8. *A. viaticus*. (Entire.)

PLATE VIIA.

- Fig. 1. *Folsomia quadrioculata* (Tbg.). Mucro.
 Fig. 2. *Dicyrtomina minuta* v. *coulonii* (Nic.). Mucro and part of dens.
 Fig. 3. *Pseudosira domestica* (Nic.). Mucro and part of dens.
 Fig. 4. *Sminthurides aquaticus* (Bourl.). Male antenna.

PLATE VIIB.

- Fig. 1. *Dicyrtomina minuta* v. *coulonii* (Nic.). Claw and tip of tibio tarsus.
 Fig. 2. *Podura longicornis* Müll. Claw (ventral view).
 Fig. 3. *Folsomia quadrioculata* (Tbg.). Claw.
 Fig. 4. *Pseudosotoma sensibilis* Tbg. Claw and tip of tibiotarsus.

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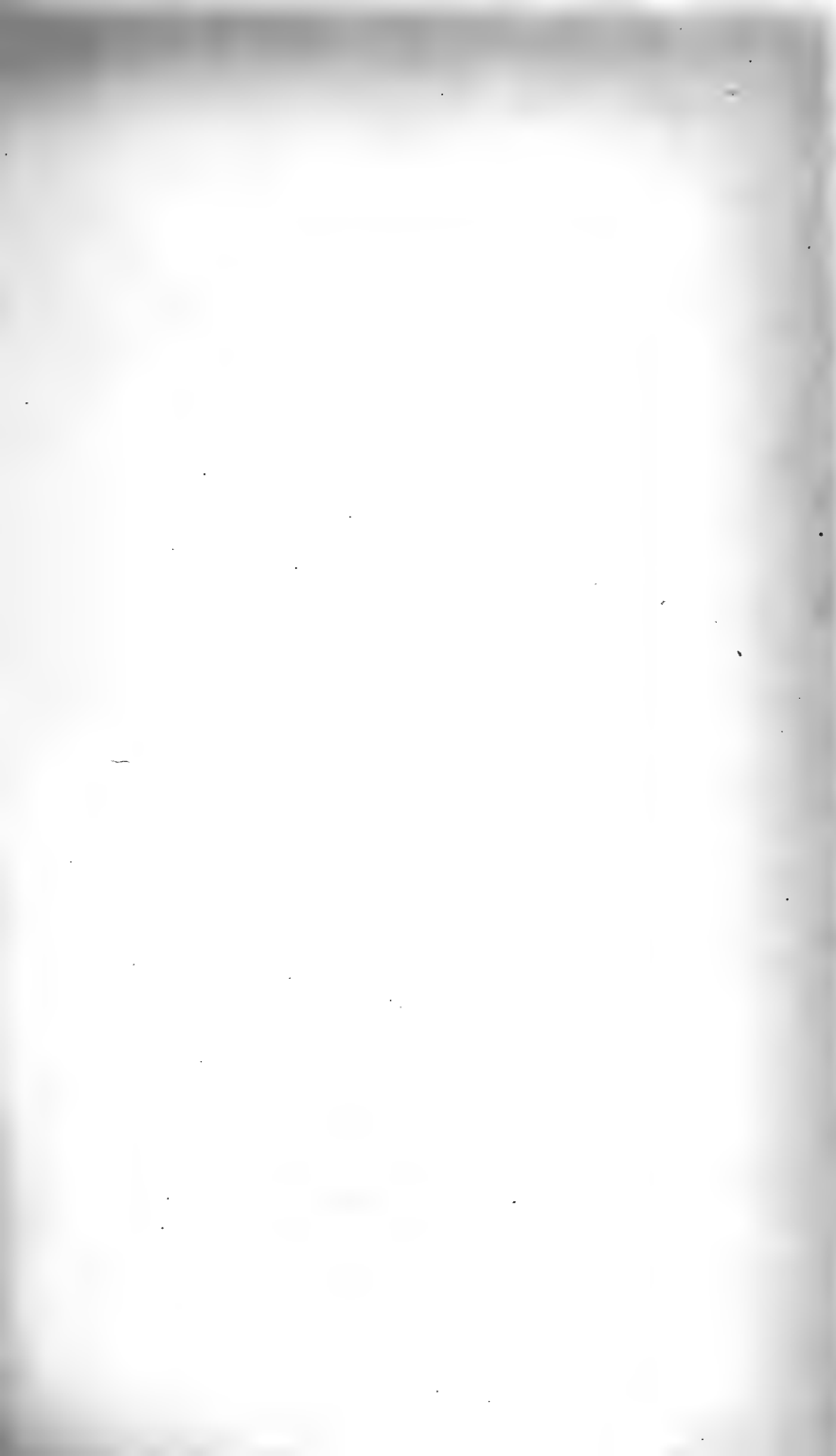




Photo. W. H. Spreadbury.
LONG-TAILED TIT AT NEST.

BIRD PHOTOGRAPHY WITHOUT A HIDE.

By W. H. SPREADBURY and W. J. FINNIGAN.

Read 13th March 1946.

We would not presume to give advice on bird photography. Ever since the Kearton brothers began their work the popularity of bird photography has continued to increase. Enthusiastic camera-users, amateur and professional, looking for new subjects soon discovered that bird photographs were sure of attracting attention and were certain sellers. Such photographers helped to swell the ranks of those ornithologists who realised the help the camera could give in recording the birds that interested them, and it must be admitted their work has reached a very high standard. This type of work demands far more time than the average busy naturalist with his varied interests is able to give, for to achieve success a hide is usually necessary as well as much preparation.

The breeding season offers the best opportunities and so photographs at the nest are the rule, though of late years some excellent studies of birds "away from the nest" have been made. Even for these a hide and some sort of decoy are generally needed, and a telephoto lens is particularly useful.

Thus bird photography becomes so absorbing as to leave little time for other field work. It is to those who either cannot afford the time or who do not feel justified in devoting too much of their time to bird-photography that our remarks are addressed. Many would like to record their finds, but the naturalist whose bird-watching takes him to commons and other places accessible to the public finds the use of a hide almost impossible for obvious reasons. Nevertheless, in the course of bird-watching it is possible sometimes to obtain quite interesting photographic records without a hide.

Naturally, the number of species that can be attempted is limited; but experience soon showed us when we were likely to be successful and when we could safely make an attempt without endangering the safety of the birds and their young. Even when our photographic efforts failed, the time spent was not wasted for there were interesting observations to be made and; perhaps, a useful hint for improved technique on some future occasion.

It was soon clear that individual birds re-acted differently to the camera close to the nest, even when we were concealed with thread in hand some distance away. And this, in general, was our method of approach. The camera was fixed up reasonably near the nest, the lens stopped usually to f.8 and the shutter set for 1/25 sec.—a safe speed to begin with. There were times when a longer exposure could be safely attempted. Then, with a thread attached to the shutter, we retired a

short distance away, took as much concealment as the terrain allowed, and waited.

Some birds were so tame that even while we were focussing the bird would return to the nest, indifferent to our presence. Indeed on some occasions this tameness was quite disconcerting, and the bird had to be hustled from the nest until we were ready. We recall a Reed Bunting that perched on the focussing cloth over the photographer's head; and a Wood Warbler that hovered in front of the lens and actually settled for a moment on the operator's hand as he held the release. Such birds were easy subjects and with those, of course, we abandoned the distant thread release and began work straight away at the nest.

But it was not always as simple as this. Our practice was to give up and take the camera away from the nest if one or other of the birds did not show signs of proving a good subject within a quarter of an hour or so. The time, of course, depended on the circumstances. There was the well-being of the bird and its young to consider, and the inroads into our few precious hours in the country.

You will appreciate that we said one or other of the birds showing signs of returning to the nest, because one curious fact soon became plain. Sometimes the hen, sometimes the cock, and sometimes both birds proved tame. Perhaps, we should add, often neither, but then these attempts were doomed to failure from the start. This variation in behaviour occurred in the same species and even with the same individual on different occasions; therefore one could never tell what the result would be until the camera was set up.

But what a pleasure it was at times when the bird was a good subject, to sit quietly by the camera, hand on the release, nest only a few feet away and watch the birds carrying on the business of feeding the young, apparently quite oblivious of our presence. We have vivid recollections of very tame Wood Warblers which repeatedly brought larvae of *Hipparchus* (*Geometra*) *papilionaria*. We had searched for these larvae in vain earlier in the day!

And what delightful birds were the Reed Warblers, whose charming domestic life was carried on within a few feet of us. Frequently it was necessary to work the camera with the thread, and when the distance was rather great and the view of the bird not too good there was a good deal of luck about the result, but the happiest times were always when the birds allowed a near approach and one could feel almost like one of the family.

While it was advisable to keep quiet and still, we discovered that absolute stillness when near the nest was not essential. Rather we found that a seeming quiet indifference to the whole proceedings, with the face averted from the bird, was the most successful. One seemed to be accepted as part of the landscape, and this allowed gentle movements which were very comforting when our body position was rather awkward and cramp threatened, or the mosquitoes were particularly blood-thirsty.



Photo. W. H. Spreadbury.
REED WARBLER AT NEST.



Photo. W. J. Finnigan.

MARSH TIT AT NESTING HOLE.



WHINCHAT.

Photo, W. J. Finnigan.

Sudden movements always scared the birds, and it was noticed that on windy days it was rarely worth trying for a photograph. There was the risk of movement just at the wrong moment, and the rustling herbage often kept the birds in a continual state of anxiety. Even very tame birds were difficult on windy days.

We have already hinted that our methods were only possible with certain individual birds and, it is obvious to you, only possible with certain species. There are some for which a hide must be used, such, for example, as the Lapwing and Curlew; and even with a hide days of preliminary work and much patience may be required. We found stalking successful with a sitting Nightjar, and after several attempts on successive days, it was surprising how skilful we became at moving imperceptibly with the camera nearer and nearer to the nest. It was always an exciting moment when, having approached thus far, we decided to chance another foot or two.

But we have said enough. Our attempts at photography have given us many happy hours of intimate acquaintance with some of our breeding birds, during which we learnt much that we should not have learnt without the camera. We have gained pleasure from our photographs, a pleasure increased by recollection of the circumstances in which they were taken. And now we have the added enjoyment of showing you some of the results of our efforts.

SEX ATTRACTANT PRINCIPLES OF MOTHS.

By Dr HAROLD KING, F.R.S.

Read 27th March 1946.

When I was in Washington in July I took the opportunity of paying a visit to the Bureau of Entomology of the United States Department of Agriculture at Beltsville, a few miles north-east of Washington, to gain some first-hand information from Dr Haller on the work he and his colleagues, Acree and Potts, have been doing on the nature of the sex-attractant principle of the Gipsy Moth.

Now by way of introduction to the subject I should like to recall a few facts with which you are more or less familiar. This Society, I am glad to think, is essentially a Field Society and many of us are acquainted from our own experience with the power certain freshly-emerged virgin female moths have for attracting numbers of the opposite sex. Many suggestions have been made to account for this attractive power; electric waves, sound waves and odoriferous principles secreted by glands. The famous French entomologist Fabre held the view that the male was attracted by waves and not by material particles of scent. He thought, for instance, that the female Oak Eggar could not give off scent molecules but that something about it vibrated causing waves which could be propagated to distances incompatible with an actual diffusion of material particles.

We know now, however, that an explanation in terms of wave motion is untenable. There are many recorded instances in entomological literature where the receptacles which have held the virgin female have been attractive to the male moths many days afterwards. Again, the attractive principle is carried by the wind and it has been shown experimentally that an isolated abdomen or even a spot where a female has rested will attract the males. Furthermore, the male is not attracted by the female in an air-tight vessel. In fact, all the phenomena suggest that a scent is being emitted by the female moth.

Now, if scent is the basis of the attractant property there should be structural features associated with the emission and recognition of scents. Scent organs are common in lepidoptera and they are best developed in the Lasiocampidae and Bombycidae, where it is claimed that the ova are ripe for fertilisation when the female insect leaves the pupa.

If a section is made through the abdominal tip of a female *Plodia* the scent glands are prominently visible as sacs which are eversible. When the female is "calling" these scent-producing membranes are exposed and the fluttering of the wings probably helps in the dispersal of the scent.

Freiling, in Germany, saw minute drops of liquid like sweat on the surface of the everted glands of a species of *Orygia* and the liquid absorbed on blotting paper was attractive to the male of the species.

In certain species the roles are reversed; the female seeks out the male and some male moths have a pencil of hairs for dispersing scent which it has been suggested has an aphrodisiacal action on the female.

The most conclusive evidence in favour of the scent theory of attraction would be the isolation of the scent in pure form. The work of Haller and his colleagues in the U.S.A. and of Butenandt in Germany conclusively shows that the sex-attractant principles of the moths they examined were definite chemical substances.

In the Eastern part of the United States the Gipsy Moth is a serious menace to forest trees, particularly in Massachusetts. To give you some idea of the magnitude of the problem presented by this insect, in 1928 eight men collected 300,000 pupae of the female moth in 21 days, which is equivalent to 1800 pupae per man per day.

During the past year 200,000 pupae of the female Gipsy Moth were collected in the countryside and distributed in trays for incubation and of these about 60% emerged. They were then put in groups into cages to mature for about a day and then the abdominal tips were cut off and dropped into a solvent such as benzene. The benzene extracted something of a fatty nature from the abdominal tips and if the benzene was allowed to evaporate on a pad of cotton-wool this could be taken into the woods, where, fastened on to a tree and provided with an appropriate water-proof cover to protect it from the weather, it proved highly attractive to the male moths. A sticky material was painted on the tree trunks near the attractant material and in this way the distribution of the Gipsy Moth and its spread into new localities could be followed.

To a chemist, however, the intriguing problem is what is the chemical nature of the attractant principle. Dr Haller and his colleagues have been able partially to purify this principle by chemical methods and the work has been confirmed in three successive years. The substance or substances belong to the group of chemical compounds known as alcohols. It can be combined with phthalic anhydride to free it from inert substances and can then be regenerated with full attractant activity.

A very similar conclusion has been arrived at by Butenandt working in Berlin. The abdominal tips of 7000 females of the silk-worm moth gave 1.5 g. of a benzene extract which in the proportion of 1 gamma, i.e., 0.000,001 g., excited the normally sluggish males. They raised their antennae and made them vibrate, and with more stimulation they fluttered their wings and then walked towards the source of the scent. When a glass rod was dipped into the extract and put near the males they all followed it and after a person has worked with the material his clothes became attractive to the male moth. Finally, a crystalline alcohol was isolated of which 0.01 gamma was active. It

had the probable formula $C_{16}H_{30}O_2$; it was a dihydric alcohol and was quite specific for the silk-worm moth.

Both lines of investigation have thus led to comparable results and they raise a number of very interesting questions, in fact they seem to raise more problems than they have solved.

In the first place these scents are specific for one species only. Are we therefore to assume that in every species the female moth that attracts the male secretes its own specific attractant chemical substance? It will mean a large number of different chemical substances and from the chemical side I see no difficulty. We know that the least changes of chemical structure of scents give rise to substances with different odours.

In the second place, what are these sex-attractant principles derived from? Are they derived from the fats in which they are soluble, are they derived from cholesterol or from the closely related sex-hormones, some derivatives of which are known to be scented, and will there be a structural relationship between the scents in any one genus?

In the third place, is it really feasible for a moth to emit scent in sufficient quantity for it to be detected at a distance of 2 miles? On this question I think we have sufficient data to give a fairly conclusive answer.

Butenandt found that his purest material, as I have already mentioned, attracted male silk-worm moths from a short distance with only 0.01 gamma of material. This quantity is one one hundred millionth part of a gram or, as can be easily demonstrated, it corresponds to 2×10^{13} molecules. This is a very small weight indeed but it corresponds to an exceedingly great number of molecules, each of which is the carrier of the odoriferous principle. There is to my mind therefore no difficulty about the transmission of scent by female moths with the aid of the wind up to a distance of 2 miles.

Finally, I should like to give you an illustration of what the human nose is capable of. Emil Fischer, the great German chemist, and his collaborator Penzoldt found that 0.01 mg. of ethyl mercaptan, a substance related to the odour of the skunk, could be detected by the human nose in a room of 250 cubic metres. It is quite simple to show that if a sniff is approximately 20 c.c., the smallest quantity we can smell is of the order of one million millionth of a gram, or 10^{-6} gamma, of ethyl mercaptan, or if we put it in terms of molecules, this corresponds to ten thousand million molecules, or 10^{10} , a quantity still less than the smallest quantity of specific sex-attractant principle detectable by the male silk-worm moth.

COLLECTING BUTTERFLIES IN INDIA.

By Lt.-Col. J. H. B. Lowe, R.E.

Read on 24th April 1946.

These notes of my experiences of butterfly collecting in India were originally prepared to accompany the showing of a number of slides on the screen and have necessarily been adjusted somewhat to enable them to appear in print on their own, unaccompanied by pictures. I make no claim whatever to any profound knowledge of the butterflies of India. My tour in India lasted for 6½ years, but they were all war years during which the soldier led an exceedingly busy life. Such collecting that I did was done during very short periods of leave, and often I could not find time to identify, let alone study, the habits of all the interesting insects I came across. During the war years in India recreation was very hard to obtain. There were no golf balls, tennis balls, motor cars or petrol. Thus it came about that when I did obtain some leave my wife and I chose places to visit which we judged would produce a good haul of butterflies. Entomology, in short, acted most successfully in filling a very real need, and it provided just that interest and recreation which otherwise was almost impossible to obtain.

In putting down these notes, rather than attempt to describe the many species I came across, which has been done most ably in many text books, I will take in order some of the places I visited and mention one or two of the outstanding butterflies I met in those places.

Some of my earliest collecting was done in Quetta. Quetta is in Baluchistan in the extreme west of India. It adjoins the arid mass of Central Asia and consequently has a very dry and hard climate. Temperatures rise to great heights in the summer and night temperatures in the winter are very low. As a result of the lack of water, there is little vegetation. Stones abound everywhere. Quetta itself is situated in a high plain, about 5000 feet above sea level, surrounded by mountains whose peaks just reach the 10,000 foot mark. Butterflies are few; only 8% of the total found in India and Ceylon occur in Baluchistan. The Browns (Satyridae) are the family of chief interest and abundance, the colouration of their under surfaces making them blend in well with the ubiquitous rocks and stones. Good examples are *Eumenis thelephassa* Hüb. and *parisatis* Koll. There were also a certain number of Blues to be had, but mostly of the duller sorts, and I found all most difficult to name. I know of only one quick and reliable method of naming Indian Blues, and that is to take them to the Natural History Museum and ask Brigadier Evans to do it.

The strong flying Catopsiliae were well represented at Quetta. One sees these well-known migrants all over India. They easily win in a race across the stony country of Baluchistan, but fortunately they were attracted by the flowers in my garden, and I thus captured all I wanted.

Climbing the mountains round Quetta was worth the effort. It was indeed a thirst-making occupation, but after scrambling up some two or three thousand feet one comes upon a flatter type of hill with more earth and fewer stones. In these regions many interesting plants can be found (most of them well protected by spikes and thorns) and the interesting, almost black, *Karanasa uctoea* Esp. can be caught. This butterfly does not seem to come below a height of 7000 feet, or at least very rarely does so.

After eighteen months of the dry stones of Quetta I got some leave and my wife and I determined that we would go to some place where green trees and grass could be seen. As it was mid-winter, the dry season, we found nowhere nearer than Assam to fill the bill. So we made the absurd journey all the way across India from west to east, five days and five nights by train, in order to find green vegetation.

Assam is one of the richest parts of the world for the naturalist. It is at the junction of the Himalayan range, the Malayan peninsula, China and India. It has both plains and mountains, a fertile soil and abundant rainfall. Consequently it has exceedingly rich vegetation with amazing jungles, with bamboos towering to a height of forty or fifty feet. It is an entomologist's paradise, and in the words of Brigadier Evans, "variation has literally run riot." Sixty-seven per cent. of the total species obtainable in India and Ceylon exist in Assam, and although we were there in mid-winter, which is the dry season, we came upon many interesting and exciting species. Quickly noticed were a number of large white floppy butterflies easy to capture. There proved to be four species of *Delias* amongst them. These butterflies are white on the upper surface and have amazingly rich and gaudy colours on the under surface. *Euploea mulciber* Cram., the Blue Crow, was considered at the time a good capture, although by no means rare. I remember watching one for a very long time sailing about amongst the top of the jungle just below the mountain path on which I was standing. To leave the path was out of the question. Apart from the completely impenetrable jungle, the mountain slope was far too steep for moving about on. But at last patience was rewarded, and *mulciber* ventured too near the path and was captured by a lucky sweep of the net.

Mulciber is one of the Danaidae, several others of which family we came across in Assam, and which provide such a striking example of Müllerian mimicry. All Danaidae are distasteful to birds and the other enemies of butterflies, which will not touch them. This may be due to the fact that their larvae feed on poisonous and evil-smelling creepers and plants. They are also tough and leathery. I used to kill my butterflies by nipping the thorax, and always gave a good extra nip or two with the forceps to the Danaids. But in spite of this, I have opened my paper packets on reaching home and had a perfectly good and live Danaid flying out apparently unharmed. So no doubt the butterfly enemies find them indigestible as well as nasty. To help the

birds recognise the species, Nature and Darwin between them have arranged that they shall carry only a very few wing patterns and that these shall be most distinct and easily recognised. Thus it is out of a total of thirty-eight species found in India there are only three general patterns, all very striking. Many species having the same general pattern are often exceedingly difficult to distinguish from one another. The birds and other enemies have therefore only three patterns to learn to recognise, and this seem to fall within the capacity of their memories.

The Himalayan range provides some of the best collecting grounds of India, and I was fortunate enough to be stationed in Ranikhet and Naini Tal in Kumaon for some months. The country is exceedingly varied and passes from the hot humid area of the foothills through rich jungle country up through the healthy pine forests, the grass-covered meadows above the pines, right up to the area of perpetual snows of tremendous heights. Twenty-eight per cent. of the total Indian butterflies can be taken in this region. When I first went up to Ranikhet, I had to choose a hotel in which to live, and I have to own I was considerably influenced in my choice when I saw two large *Buddleia* bushes in the front garden. These bushes paid me well. They yielded *Vanessa indica* Herbst, a wonderful combination of our *atalanta* and *cardui*, and a good supply of those wonderful swallowtails, *Zetides sarpedon* L. and *cloanthus* Westw. These feed as larvae and imagines on wild clematis, and are very fast flyers, keeping high up in the trees. Without the *Buddleia* I doubt if I could ever have seen them, let alone capture them. To see them quivering their pale green shiny wings on the buddleia flowers was a never failing source of delight. *Vanessa canace* L., the Blue Tortoiseshell, was another interesting species. I never but once saw this at rest, and never observed it at flowers. It always seemed to be careering about the pine woods at a great pace, and I never captured one except by a lucky sweep of the net aimed more or less at random at a fast moving black insect. *Euthalia patala* Koll., the Duchess, gave more excitement. This huge butterfly flies very swiftly, usually around tall trees. It flies and then glides swiftly with its wings arched downwards like a partridge. I eventually found that they came down to water in the late afternoon, and that they could then be captured by a swift downward stroke of the net when at rest. As the ground was always very hard this process was by no means good for the net but it had to be done. The large fritillary, *Argynnis childreni* Gray, provided a magnificent sight amongst the thistles just before the rains, and as a contrast the huge all-black swallowtail, *Tros varuna* White, occurred at the same time. This is one of the poisonous family of *Tros*, the Bird Wings, and is jet black on both surfaces without any markings at all. They fly very slowly and seem to travel very short distances. I first remember seeing one some way below my bungalow one evening returning from work. I, however, had time to get home (uphill in the Himalayas), find my net,

and return in time to capture it. *Melanitis leda* L., the common Evening Brown, flies in the late evening and, I think, by night as well. I have seen two or three attracted to the electric light in the verandah of my bungalow just like moths.

The species *Melanitis leda* and *Precis almana* L. well show the seasonal variation that occurs in so many butterflies of India. The undersides of the wet season forms carry the normal patterns often well striated and ocellated, whereas the dry season forms are dingy brown with little pattern. The reason for this is clear. In the rains the country is covered with luscious and varied growth, amongst which a butterfly can hide with ease. During the dry season the country is all burnt up and bare earth and dried leaves cover the ground. Against such a background the dry season forms merge with complete efficiency.

We were fortunate enough in being able to live for a time in the regions of the North-west and the Himalayas, but inevitably we were eventually condemned to serve in the plains of Central India. By the "Plains" is usually meant the huge flat area of country comprising the basins of the Rivers Indus and Ganges with their many tributaries. The plains stretch right across Central India from Peshawar in the north-west to Calcutta in the east. Entomologically it is a comparatively poor region. Only seven per cent. of the total Indian butterflies occur in it. This poverty is due partly to the fact that nearly all the ground is under cultivation, but more so to the long dry season which lasts from October to June. During these nine months little rain falls and a temperature of 115 degrees in the shade is often recorded. Consequently the ground gets completely dried up and no shallow-rooted plant can survive. Little *Colotis etrida* F., a tiny Orange Tip, is a good example of a desert insect. It flies in the hottest part of the hottest days over ground with scarcely a green thing growing on it. I have never discovered what the larvae can possibly find to eat. *Danais chrysippus* L. is to be met with frequently in the hottest parts throughout the year. Its larvae feed on a peculiar form of Milkweed which has deep roots and always remains green and juicy. I soon met the distinctive-looking males of *Hypolimnas misippus* L. flying round the garden. It was some time before I discovered its truly astonishing female. This female is as different as can be from its male and almost indistinguishable from the poisonous *Danais chrysippus*. *Misippus* and *chrysippus* fly about together, and I have seen a couple perform a complete "Box and Cox" on a flower. These species provide us with an outstanding example of Batesian mimicry, and we see a female of a butterfly which is poles apart from the Danaids biologically; assuming exactly one of the distinct patterns of the Danaids, which we have already seen are easily recognised and avoided by butterfly enemies. The plains of India provide many other examples of this astonishing mimicry, notably the swallowtail *Papilio polytes* L., which has three female forms, one normal like the male, one mimicking the poisonous *Tros aristolochiae* F., and one the poisonous *Tros hector* L. Further,

if *aristolochiae* is common in the district, that will be the pattern of the female *polytes* occurring there. If *hector* is common, most *polytes* females will adopt that form. Space does not permit one to enlarge on this subject, but it is one of never-ceasing surprise and interest to collectors in India.

One of the last spells of leave we enjoyed was in Pachmarhi in the jungles of the Central Provinces. This region lies in the centre of the peninsula of India south of the Indo-Gangetic plain. Pachmarhi is in low hills about two thousand feet above sea level and the whole country is cut up by small rivers and streams flowing in deep ravines. We visited Pachmarhi in April when the country was very dry, and water proved the one great attraction to butterflies. Numbers could be found on the wet stones and mud on the banks of the streams, but few elsewhere. We soon found the brown *Lethe rohria* F. which flew around the rocks, hiding in the dark cracks and crevices. They were not easy to capture, until one day I spotted a particularly nice dark looking hole in a rock and placed the large net over its mouth on chance. Seventeen *rohria* were the immediate result! We found the fine swallowtail *Pathysa nomius* Esp. resting on damp sand on the banks of the streams, and quivering its wings in the sun. A lovely sight. The tails of a good specimen of the insect measure well over half an inch in length, but they are so thin and fragile that it is exceedingly difficult to capture a specimen with its tails intact. If they are not broken before capture, they are only too liable to get broken in the net.

I had previously heard of the partiality of certain butterflies for hill tops. There was a small rocky isolated hill just behind our hotel. At the very top was a large rock with a bush growing in a cleft. Round this rock I found flying the beautiful blue *Tajuria cippus* F. with its magnificent sheen, and also the strong flying *Eriboea athamas* Dry. Several specimens of each were flying round and round this rock, making me, who was perched uneasily on its summit waving my net in wild sweeps, quite giddy. *Athamas* and all its kind are most vigorous flyers, almost invisible on the wing. When caught they fight like mad things in the net and quickly tear their wings in pieces before they can be quietened.

The following day we saw a huge butterfly careering through the woods and at once recognised it as *Kallima inachus* Bdv., the famous Oak-leaf butterfly. Later we found their real haunt, a rocky stream which descended very steeply through a narrow gorge with huge rocks and boulders on each bank. We returned next day with a mixture of "sugar," to which Oak-leaves are reported to be partial, but not one was attracted, and although several were flying they seemed quite uninterested in the smell of the sugar. We soon found, however, that they rested on the large rocks bordering the stream in the gorge, a most curious habit, seeing that their camouflage amongst leaves is as perfect as can be, and that they are outstandingly obvious resting on the rocks. The place abounded in large lizard-like creatures which also

spot *inachus* with ease, and we saw several creep up and pounce on the butterflies. Most were too wary to be caught, but several had large bites taken out of their hindwings, thus showing that the lizards at least obtained an occasional mouthful. Other observers have noticed that *Kallima* often does not make use of its perfect camouflage. They often rest on a twig but place themselves the wrong way along it with their tail towards the tip of the twig instead of towards the stem. Thus the "leaf" appears to be growing out of the twig the wrong way round. It is said that the undersides of no two *inachus* are the same. I have certainly noticed the most amazing variation, but all are wonderfully leaf-like and some reproduce the rust spots and fungi of diseased leaves in a remarkable manner.

I found that it was by no means easy to catch this butterfly even allowing for his foolish habit of resting on rocks. I found them very wary and my own mobility scrambling from stone to stone in the midst of a steep and rushing stream was considerably restricted. I remember there was one spot on a large rock favoured above all others. It had a small tree with a single stem growing just in front and it was exactly behind the stem that I nearly always saw a fine *inachus* resting. The stem prevented direct action with the net, and of course, whichever side the net approached, *inachus* popped out the other. Eventually I tried a net in each hand and attacked from both sides of the tree at once, but *inachus* certainly knew that I was naturally right-handed, and always came out by the left side! I think I should mention that I returned to the locality at dusk with the idea of easily boxing *inachus* as they slept on the rocks. I found, however, that not one was to be found. All were secure amongst the trees and quite undiscoverable. I think they only patronise the cool rocks during the heat of the day in hot dry weather.

With the capture of *Kallima inachus*, I must bring these notes to a close. I again apologise for their somewhat crude character when read apart from the pictures that should accompany them; but hope that they may possibly assist others to recollect their own experiences of many happy hunts and strengthen their resolve to pursue the hobby of entomology in whatever circumstances or land they may be situated.

[NOTE.—The nomenclature used is that contained in *The Identification of Indian Butterflies*, by Brig. W. H. Evans, 2nd Ed., Revised, 1932.—ED.]

SOME PRELIMINARY OBSERVATIONS ON *PIERIS NAPI* (L.).

By J. ANTONY THOMPSON, M.A., F.R.E.S.

Read 22nd May 1946.

During the past two years I have been engaged upon a comprehensive study of the entire natural history, taxonomy, and genetics of *Pieris napi* with a view to producing a complete thesis upon this butterfly as it occurs in the British Isles.

Some months ago your Secretary did me the honour of inviting me to present the results of this work to our Society. Owing to many difficulties, the chief of which were lack of time and equipment, I have been unable, so far, to achieve more than the rudiments of such a task. These remarks, therefore, represent no more than the beginning of an investigation, and must be treated merely as an interim report pending the solution of many interesting problems which have so far been disclosed. I hope, however, perhaps in the autumn of 1947, to be able to present to you the completed work. In the meantime may I ask for your indulgence for the preliminary nature of this present paper.

So far my work has necessitated the rearing of more than 150 separate broods of the butterfly, each of which has been meticulously segregated under conditions which made error, in this respect, impossible. These broods produced a grand total of 6236 ova, of which 43.11% were fertile. The largest number laid by any one female was 224, of which 139 produced larvae. This family was from a pairing of two homozygous var. *hibernica* (Schmidt), which seems to show that fecundity is not always affected by inbreeding. Moreover, a cross between a *hibernica* male and a white heterozygous female, with Somerset blood, produced 155 ova, all of which were infertile. Thus prolific oviposition does not seem to be a guide to fertility in every case. I might add here that the father of this large infertile brood successfully fertilised his full sister, another homozygous *hibernica*.

While on this subject it may be of interest to point out that a male can fertilise any number of females throughout the whole of his lifetime, although I have frequently seen this point treated with some misgivings both in print and in correspondence. As an example I will cite the case of a huge white male which I received by post one day from Aberdeen. He had been five days in transit, but, within 48 hours of his arrival, he had paired with five females, four of which produced fertile ova, the exception to fertility being his third pairing, which eliminates the possibility of infertility at either extreme of his career.

The duration of coition is sometimes a guide to the success of the union. Recorded times of my pairings vary from 45 mins. to 8 hrs. 35 mins.; and in no single case was fertility achieved by coition lasting longer than 2 hrs. 45 mins. Duration of coupling beyond this period always indicates mishap.

On the other hand females, as far as I have been able to prove, can be fertilised once only. They will pair any number of times *before* fertilisation, but I have never yet been able to induce a male to pair with a fertile female. Lately, in fact, I have found it to be an infallible test of fertility, and, in cases where I have been anxious to know whether a previous pairing has been successful, I have segregated the eggs so far laid by the female, and caged her with another male. The female always seems ready to pair again, but, after investigation, the male will have nothing to do with her if she is fertile, but will pair readily if her previous coition was abortive. The segregated ova from the first pairing have always proved this to be correct.

Napi seems to pair readily in captivity, far more so than its congeners *P. brassicae* and *P. rapae*, and, providing that there is some sunshine and the butterflies are protected from cold winds, I have never yet failed to obtain a desired mating, either in or out of doors. Particularly hot weather is not usually the most propitious of conditions. When paired the butterflies seem loth to move and can be picked up, usually, without difficulty. In the rare cases when movement has been observed the male is always the engine of locomotion. I have had pairings during all the hours of sunshine, which seems to indicate that this butterfly is not particular as to the time of its mating. Before leaving the subject of pairing I would add that fertility seems to be a matter of compatibility between the two individuals. For instance, a female which has paired with a male A, and has proved infertile, frequently produces a fertile brood to male B, whereas male A is successful, later, in fertilising another female, thus showing that the fault is not inherent in either partner of the first abortive pairing. Whether this compatibility is previously determinable I have not yet been able to discover, though I suspect it may have something to do with the relative ages of the individuals. This I hope to be able to discover by the time my final thesis is ready.

Observation of the early stages has produced little to add to our existing knowledge of the subject. Some minor points, however, are worthy of mention.

Occasionally ova are of a deep rust colour, instead of the usual cream shade. These reddish ova have appeared both oddly and in numbers in several broods, but only one brood has been composed entirely of the darker colour. This variation of shade is no guide either to health or to fertility of any particular ovum.

The larvae frequently turn cannibal and I have also seen them attack pupae. This, however, is unusual, and may possibly be caused through failure to discriminate from a similarly coloured foodplant, as the only pupae which I have seen attacked have been green ones attached to the stem of the pabulum.

The larvae show great variation regarding speed of development and laggards frequently, though not always, fail to produce imagines. This rate of growth does not seem to be influenced by climatic condi-

tions, a point which also refers to the ova, which may hatch in anything from five to fifteen days after being laid.

It is well known that there are two distinct forms of the pupa and I have often had individuals embodying both colourations, such as buff thorax and abdomen with bright green wing-cases. Moreover, the two extremes of colour, from bright green to light biscuit, vary towards each other so that some individuals are of a shade impossible to classify as either green or buff. The black markings also vary considerably, sometimes being confined to a few spots, and occasionally spreading to such an extent that the wing-cases are entirely black.

It has frequently been stated that this variance of pupal colour may be caused either by the situation selected for pupation or by some "effect" of light. I can definitely refute both these statements and have had many instances among my stock which prove that there is no external cause of colour determination. It is only necessary to quote one case. Two larvae, brothers, feeding together in a glass-topped tin, both pupated on the lid, in the centre, barely half-an-inch apart. Pupation occurred within a few minutes of each other, under identical light environment. One pupa was brilliant green with very few black markings, the other was a well-marked buff example.

I have been at much pains to discover any significant relationship between pupal colouration and imaginal variation, but there seems to be absolutely no connection. All my broods have produced either all green pupae or a mixture of both colours in every conceivable proportion. In my experience the green pupae have been more prone to hatch quickly than have the buff, but Dr H. B. Williams assures me that he has had precisely the opposite experience, which seems to show that my results have been merely coincidental.

It is well known that there are two periodical forms of *napi* which have been termed the "Spring" and the "Summer" broods. Some authors, having detected third and fourth broods, have allowed themselves to indulge in special patronymics for these further emergences. All this rubbish has clouded the simple and inescapable truth of the matter, which was explained by Jarvis (*Proc. S.L. Ent. & N.H. Soc.*, 1941/42, Pt. 1). There are two forms only; that in which development is arrested in the pupa throughout the winter, and that in which development continues without definite halt, though at varying rates of progress, until the emergence of the imago. Jarvis (*loc. cit.*) states that this phenomenon is determined by an inherited chemical activator, and while fully agreeing that this is the case, I am convinced that there is an environmental super-activator influencing the potency of the inherited factor. In support of this theory I would cite the cases of two broods, as follows. In 1943 Dr H. B. Williams had a number of pupae, in June, from a pairing between a Somerset male and a *hibernica* female, both "first brood" individuals. Of these pupae he very kindly sent half to me, a matter of three dozen, and retained the others. At this time I was in North Wales. The majority of the pupae

retained in Surrey by Dr Williams duly produced butterflies in the summer, but the entire 36 in my possession underwent an arrest of development, the first emergence being in April 1944. The second case concerns a brood shared with Mr Nigel T. Easton from eggs laid by a female in North Wales in August 1945. From this brood Mr Easton had 44 pupae in London and I retained 41 in Flintshire. Mr Easton had 18 immediate emergences, while all but one of my pupae suffered arrested development until the following spring. Mr Easton furthermore reared an F.2 generation from this stock, butterflies emerging in October and November 1945. These two cases seem to show that immediate environment can play a large part in controlling the inherited factor, although the well-known failure of pure Caithness stock to produce more than one brood a year, even in the south of England, would seem to show a variable potency of resistance. I have not been able thoroughly to peruse Jarvis's paper but I hope in due course to be able to co-relate these remarks with his theory. I must, therefore, crave indulgence if I have overlooked any part of Jarvis's work dealing with multifactorial activators.

From this it will be seen that pupal development is either continual or arrested, each of which forms produces imagines with particular markings well known to lepidopterists and usually dubbed respectively "Spring form" and "Summer form." These terms can be very misleading as frequently overwintering pupae may not emerge until the following August. Such imagines bear the characteristics of what is known as the "Spring form" and thus a dangerous confusion is created for the taxonomist. This is particularly noticeable in the "banded" forms of the female, extreme examples of which are produced by those pupae which emerge without delay but whose full sisters which overwinter produce specimens with both the "banding" and the apical blotch much reduced.

Before passing to the various forms of the imago mention must be made of that menace to the breeder popularly known as "blackening-off." This scourge has destroyed approximately 40% of my pupae during my two years' work, a figure which seriously threatens the value of statistics referring to genetics. I hope soon to have, on the spot, laboratories which will enable me to make a detailed investigation of the disease. At present I can only hazard a guess that it is a virus transmitted to the larva through the agency of the foodplant. I have attempted, without success, to find some line of inheritance of this weakness and also there seems to be no climatic or temperature influence; indeed, my investigations all point against these possibilities, which leads me to believe that the disease is introduced into the larva by an outside agency.

P. napi is probably the most variable of all British butterflies. The gradual realisation of this fact has led a great many lepidopterists into large-scale breeding of the insect and the discovery of unlimited forms of aberration. Unfortunately, it has also resulted in great confusion

of the nomenclature appertaining to many forms. The thoughtless and precipitate systematics of most of the older British entomologists brought into being a number of both synonymous and superfluous varietal names, a state of affairs which made it almost impossible to discover the correct name even for well-known forms, and to which the recent work of Müller and Kautz has added still greater confusion.

I had hoped to be able to attempt a complete revision of the nomenclature of our British forms, but the difficulty caused by the war of referring to types in continental collections has forced me to postpone any attempt at a finished catalogue for the time being. I am, however, continuing work to this end, and hope that I shall soon be able to place before you a revised list, based on genetic principles, of the British forms of *napi*.

For the time being, therefore, I shall mention only such forms as are in particular need of clarification and on which most of the work has been completed.

The ground colour is subject to an immense range of variation ranging from the normal white in one direction to the citron yellow of *hibernica*, and in another through various shades of coppery buff to specimens approaching the form known as *bryoniae* Och. There are in collections many brownish specimens but all of this colour which I have investigated have been subject to humidity, either in a relaxing tin or otherwise, and I have no reason to suppose that any of these brown specimens is genuine. The genetics of var. *hibernica* are well known and there seems to be no doubt that it behaves as a simple recessive. Shepherd (*Entom.*, 1936, 69: 61), attempts to state that this is not the case when *hibernica* is paired with a white example from Irish stock. The results of my experiments have not borne out this suggestion, though I am still at work on these Irish forms and do not feel that I have yet sufficient data to be dogmatic in contradiction of so careful a worker as Shepherd. The first person, apparently, to attempt an elucidation of this problem was Schmidt, but his results, as reported by Müller and Kautz (1938), are unintelligible and valueless. Among many dozens of segregated broods of homozygous var. *hibernica* I have only had two instances where this form has not behaved as a simple recessive; namely, in a brood which produced 35 pupae there was one individual of a dirty pinkish white, and, in another brood of 18 pupae, a similar specimen occurred. Both these were cripples and both females, and although I tried hard to obtain a pairing from each the crippling was too extensive to permit this. I conclude, therefore, that these two specimens had been subject to chromosomic injury during conjugation. I have two other specimens which, although bearing a superficial resemblance to very pale var. *hibernica*, are obviously of a different gene-complex. One of these, a female, is very delicately flushed over its entire surface with what would appear to be a heavily diluted lemon yellow. This was an isolated example from a pairing, which produced only five pupae, between a wild white male from Flint-

shire and a var. *hibernica* female. The other four pupae produced normal white males. The other specimen was purchased from Mr L. W. Newman, and was bred by him from Sligo stock. Before suggesting a name for these insects I am awaiting additional data, but I would emphasise, now, that they are in no way whatever connected with pale specimens of *hibernica*.

* Another colour form to which I should like to refer is that in which the entire surface of the wings is of a smoky, greyish, coffee colour. There are, to my knowledge, at least two specimens of this form in existence in British collections, one of which, a female, is in my possession. This form I name

fumosa ab. nov.,

the type being in my collection, taken at Sudbury, Suffolk, 5.8.1925, by W. Harwood.

There are also specimens in which the pigmentation is unevenly distributed on both surfaces, some of which bear a superficial resemblance to the insect figured by Müller and Kautz on Plate XIII, fig. 12. These cases are particularly noticeable in examples of var. *hibernica*, and, for these, I propose the name

irregularis ab. nov.,

the type of which is in my collection, ♂ bred Donegal origin, 5.vi.1935, H. W. Head. This name will, of course, only refer to specimens of var. *hibernica* which have the citron-coloured pigment irregularly distributed, giving an effect of having been bleached. Insects showing this peculiarity, but otherwise of the normal white form, are apparently referable to ab. *subtalba* Schima, under which title Müller figures various forms, all of which, however, are confined to the underside, whereas, in ab. *irregularis*, the "bleaching" may be present on either or both surfaces of var. *hibernica*.

The question of "banding" has been largely dealt with by previous authors with reference to the upperside of the female and a great deal of confusion has arisen, involving the erroneous application of a number of synonyms. Müller and Kautz retain two names; ab. *confluens* Schima for those specimens in which the "band" is confined to uniting the two forewing spots, and ab. *continua* Bryk. for examples in which the confluence is produced to the apex. My breeding results would appear to show that these two varieties are merely different expressions of the same cumulative gene. It would thus seem that all female specimens exhibiting "banding" on the upper surface are referable to ab. *confluens* Schima, 1909, which has fourteen years' priority over the name *continua*.

I have purposely referred to this aberration with regard to the upperside of the female only as my breeding results have shown that the so-called "banding," which occurs on both surfaces of male specimens, is due to the influence of two different genes. It is thus necessary to propose two further names, one for male specimens exhibiting "band-

ing " on the upperside and another for those showing the same phenomenon on the under surface. These I name as follows

***lachrymosa* ab. nov.,**

male specimens exhibiting a series of black scales immediately below the normal forewing spot, on the upperside. These scales may also be produced towards the apex. Type in my collection, bred Donegal origin, 6.viii.1944, J. A. Thompson.

***fulgoris* ab. nov.,**

male specimens exhibiting a series of black scales immediately below the normal forewing spot, on the underside. In some cases these scales may form a band uniting the two underside spots where both are present, but occurs equally in specimens in which the lower spot is absent. As in ab. *lachrymosa* the extra black scaling is often produced upwards to the apex. Type in my collection, bred Donegal origin, vi.1936, J. A. Thompson.

Although I am now certain that the forms *confluens*, *lachrymosa*, and *fulgoris* are the result of different genes, I have not yet sufficient data to determine with certainty the cause of "banding" on the underside of the female, but will deal with this in my later paper.

It is, however, quite obvious that all "banding" is the result of cumulative inheritance and is, therefore, not recessive, as had been supposed. I hope to be able to give an exact account of the operation of these factors in my future work, as they present many points of extreme interest to geneticists.

I have also bred several specimens of a most beautiful form of the female in which the apical patch is extended to form an area entirely covered with black scales from the costal extremity of vein ten through the upper forewing spot to the marginal extremity of vein four, and, for this form, which is also the result of a cumulative factor, I propose the name

***impleta* ab. nov.**

Type in my collection, bred Donegal origin, 8.viii.1944, J. A. Thompson. I would add that the *impleta* factor is quite distinct and in no way connected with the genes which give rise to "banding."

In *P. napi* the phenomenon of gynandromorphism is by no means rare and is, in fact, probably more prevalent in this than in any other British butterfly. The comparative similarity of the sexes may account for the fact that there are fewer examples of gynandromorphic *P. napi* to be seen in most collections than similar aberrant forms of the Lycaenidae.

In *napi* gynandromorphism may assume expression either as bilateral examples or as mosaics, the latter being either symmetrically marked or otherwise. Very occasionally the mixture of the sexes is accompanied by a corresponding mixture of ground colour as in the well-known example of the heterochroic bilateral gynandromorph bred by Mr Head some years ago, in which the right-hand side is a white male and the left-hand side a female var. *hibernica*.

Last year, in November, Easton bred two extremely beautiful mosaics, both heterochroic and gynandromorphic, the female portions of the scaling being of a deep buff, var. *flava* Kane, and standing out in conspicuous distinction from the white male scaling. I have a specimen exhibiting similar phenomena, purchased from Mr L. W. Newman, in 1939, which was bred from Donegal stock. As far as I know these are the only three heterochroic mosaic gynandromorphs in existence, though in the summer of 1945 Easton bred two white males with streaks of *hibernica* coloured scaling on the upper surface of the hindwings, one of which he most kindly presented to me. These specimens need careful investigation before their origin can be determined.

Although I have referred to Easton's heterochroic mosaics as gynandromorphs, I personally incline to the opinion that they should be more strictly termed intersexes and have probably arisen through the discrepancy in valency brought about by crossing two isolated races, the P.1 generation being descended from a Scottish female of Easton's and an Irish \times Welsh male of mine. We had never previously collaborated in a pairing and our stocks were obtained from completely different sources. We have both been able to continue working from this stock, and I hope that it may soon be possible to determine the cause of this most beautiful and rare form.

From these few remarks, which are obviously nothing more than the trifling commencement of a vast work of much importance, it will be seen that there is great scope for research, for the taxonomist, the ecologist and the geneticist, in the study of *P. napi*. Not only is the nomenclature muddle to be elucidated, but the genetic relationship of the many forms has in most cases still to be determined.

I am continuing to work on this species until these objects have been attained, and I should very greatly welcome the assistance of any lepidopterists who would be kind enough to supply me with relevant data or personal experience to enable me more speedily to complete and present to you a cohesive account of these problems.

In conclusion, I would express my apologies for the rudimentary and immature nature of this present paper in the hope that you will refrain from judgment until the presentation of my finished thesis on this butterfly.

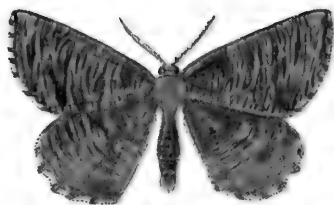
May I also express my great indebtedness to Dr H. B. Williams for his help and advice and to Mr Nigel T. Easton for his collaboration in breeding experiments and for his prodigious acumen in typing these notes to my dictation. The work of breeding so many segregated broods would have been impossible single-handed and credit for the very foundation of the work rests with my wife, who has been unflagging in encouragement and in the maternal care of hundreds of young larvae, and with Miss Naomi Cantrell Storer, who has been untiring in attention to the breeding cages and has also undertaken the preparation of the statistics for genetic purposes.

- Fig. 1 *Angerona prunaria* L. ab. *spangbergi* Lampa, ♂
Locality unknown. Ex. colls. Harper, Webb & Baldock.
- Fig. 2 *Angerona prunaria* L. ab. *spangbergi* Lampa, ♀
Brentwood. Bred June 1893. Ex. coll. C. Fenn.
- Fig. 3 *Angerona prunaria* L. ab. *fuscipicata* Williams. ♂ paratype No. 1.
Huntingdonshire. Bred 19. vi. 1938 by H. B. Williams (Brood H.D.S./L/37).
- Fig. 4 *Angerona prunaria* L. ab. *fuscipicata* Williams. ♀ allotype.
Huntingdonshire. Bred 20. vi. 1938 by H. B. Williams (Brood H.D.S./L/37).
- Fig. 5 *Angerona prunaria* L. ab. *griseoguttata* Williams. ♂ holotype.
Oxshott dist. Bred 2. vi. 1927 by H. B. Williams.
- Fig. 6 *Angerona prunaria* L. ab. *pluriguttata* Williams. ♂ holotype.
London. Bred July 1903. Ex. coll. C. Fenn.
- Fig. 7 *Angerona prunaria* L. ab. *diluta* Williams. ♂ holotype.
"Hunts. x Sussex". Bred June 1941 by Dr. H. D. Smart.
- Fig. 8 *Angerona prunaria* L. ab. *postfusca* Williams. ♂ holotype.
Arlington, Sussex. Bred June 1907 by L. W. Newman.
- Fig. 9 *Angerona prunaria* L. ab. *pallidaria* Prout, ♂
Chattenden. Bred 1897 by B. H. Crabtree.
- Fig. 10 *Angerona prunaria* L. ab. *pallidaria* Prout, ♀
Locality unknown. Ex. colls. Mason and C. Fenn.

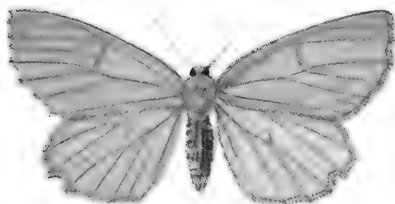
All in H. B. Williams coll.



1



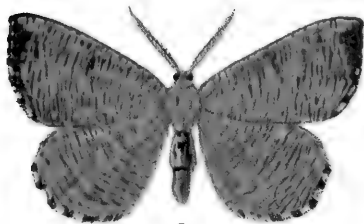
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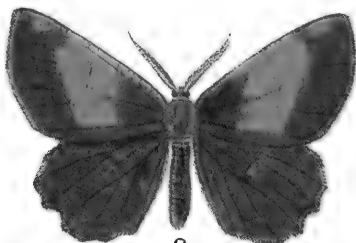
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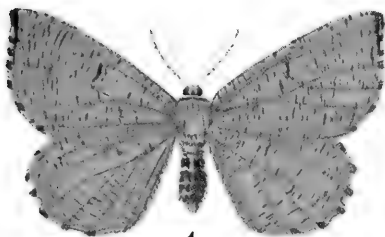
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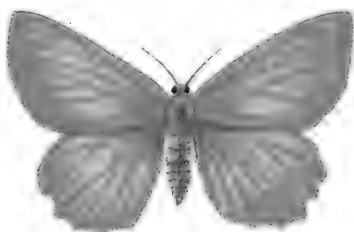
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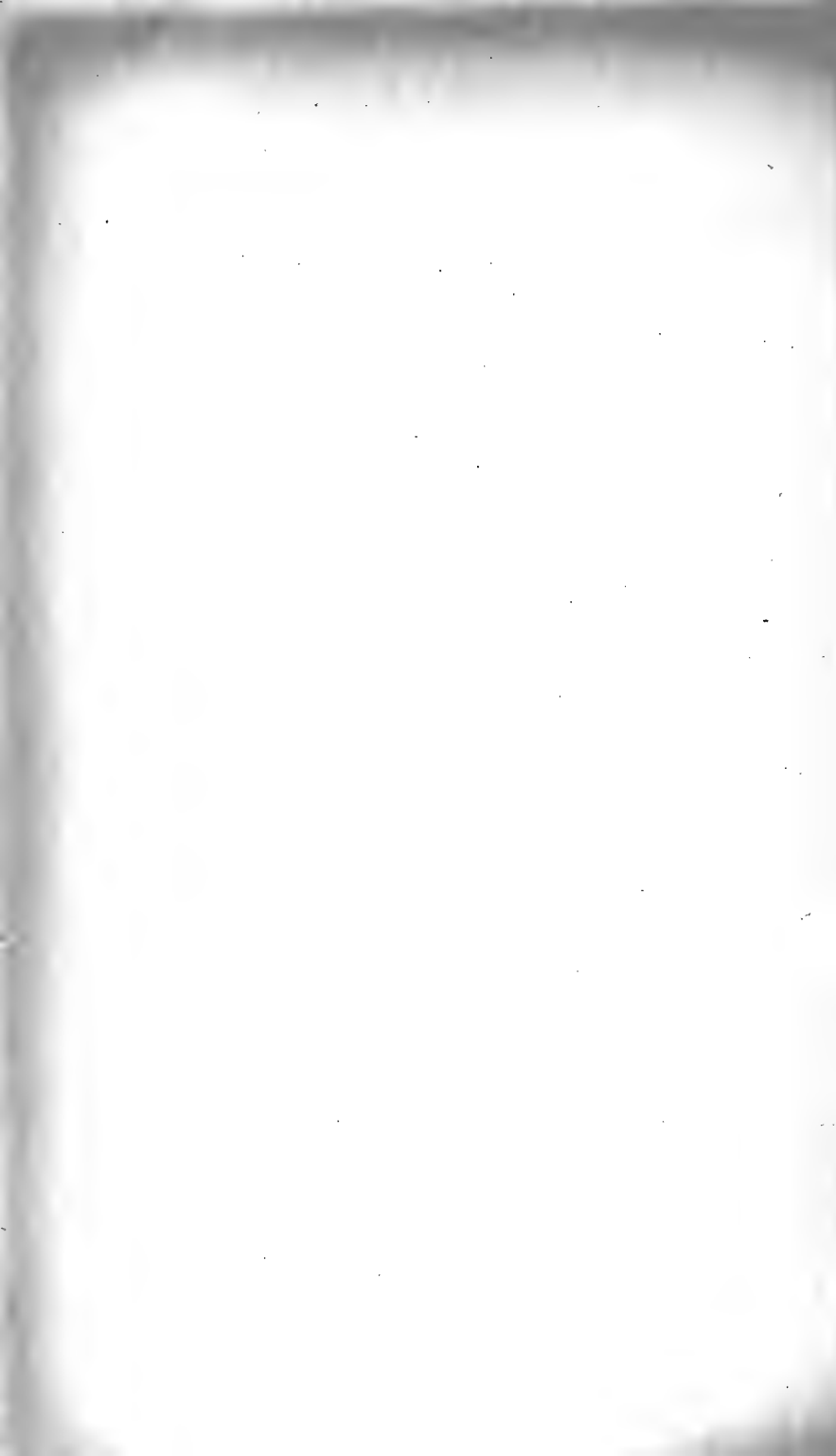
5



10

Miss Dorothy Fitchew del.

VARIATION OF *ANGERONA PRUNARIA* L.



ANGERONA PRUNARIA L.: ITS VARIATION AND GENETICS.

By HAROLD B. WILLIAMS, LL.D., F.R.E.S.

Read 10th July 1946.

By the kindness of the late Dr H. D. Smart I had the opportunity in the years preceding the recent war of breeding large numbers of *Angerona prunaria* and of making a preliminary study of the genetics of some of its forms. It became necessary to study the variation of the species in some detail and to attempt to clarify the nomenclature. A number of forms have already been named and there appears to be some confusion about some of these. I therefore propose to attempt a review of the variation of the species and to describe some forms which appear to me to be new or to have been overlooked. No such review has been attempted previously, except by Prout, in *Ent. Rec.*, 15: 149, and in Seitz, Vol. 4: 334, and those very brief notes appear to me to need to be supplemented and revised.

Nominotypical *prunaria* L. appears to be the ordinary lightly speckled English form. It occurs throughout the palearctic region from England to Japan and in England occurs throughout the South and Midlands but is absent from the North. It is an extremely variable insect, the most conspicuous aberration being the banded form ab. *corylaria* Thunberg, which Barrett treats as an "alternative form" of the species, and which occurs throughout its range. Both *prunaria* and *corylaria* are extremely variable, and I propose first to deal with the forms of *prunaria*.

1. Ab. *spangbergi* Lampa, 1885, *Ent. Tidskr.*, 1885, p. 95.

In this form as described there is a complete absence of the dark freckling. It is described from a female example and Prout (*Ent. Rec.*, 15: 149) says he has only seen it in this sex but understands that it does also exist in the male. I have not yet been able to study the genetics of this form. Examples are comparatively common in both sexes in which there are only faint traces of freckling, principally in the apical area, and these, I think, must be related to *spangbergi*. The aberration as described certainly occurs in both sexes, but it is much commoner in the female. I possess one male without any trace of freckling, which I figure (Plate xii, fig. 1) and I have a number of female examples, one of which is figured, Plate xii, fig. 2.

2. Ab. *nigrolimbata* de Joannis, 1908, *Bull. Soc. Ent. France*, 1908, p. 45.

This form is described as having, on all four wings, a narrow dark border, at its widest at the apex, and narrower in the female than in

the male. The border in the male is 5 mm. wide at its widest part. The form is unknown in England, though it is recorded from various localities in Brittany. I figure both sexes (Plate xiii, fig. 1, ♂, fig. 2, ♀).

3. *Ab. fuscipicata* ab. nov.

This form is figured in Barrett, Vol. 6, Pl. 270, fig. 1c, from an example in the Webb coll. which is now in my possession. I supposed this insect to be *nigrolimbata* until Dr Cockayne discovered the figure of that form in *Ann. Soc. Ent. France*, 1908, 77, Pl. 11, figs. 5 ♂, 6 ♀. *Ab. fuscipicata* is a comparatively common form, but appears to have been overlooked. I have a long series from Dr Smart's Huntingdonshire stock and have seen examples from Sussex and Kent. It appears to breed as a simple dominant, and, as in *nigrolimbata*, the female is less heavily marked with fuscous than the male. From larvae received from Dr Smart in 1937 I bred in 1938 21 moths, all *fuscipicata* (Brood H.D.S./L/37). The parentage was stated to be "Hunts. × Sussex" and the cross appeared to be between a male *fuscipicata* from Huntingdonshire and a typical female from Sussex. I paired two of these moths (Brood E/38) and bred in 1939 12 moths, all *fuscipicata*.

Male. As in *prunaria*, but on the outer margin of the fore wing is a fuscous blotch, not extending to the apex, 2-3 mm. in width at its widest, nearest the costa, and extending to vein 3. The fringe adjacent to the upper part of this blotch is also fuscous in the majority of examples, but the fringe adjacent to the lower part is chequered as in *prunaria*.

Female. Similar to the male, but the fuscous blotch is much smaller.

♂ holotype. Origin unknown. Ex Webb coll., labelled "Harwood coll. 1887." Figured in Barrett, *Lep. Brit. Isles*, 6, Pl. 270, fig. 1c. H. B. Williams coll.

♀ allotype. Huntingdonshire. Bred 20.vi.1938 (Brood H.D.S./L/37). H. B. Williams coll. I figure this example, Plate xii, fig. 4.

♂ paratypes.

No. 1. Huntingdonshire. Bred 19.vi.1938 (Brood H.D.S./L/37). I figure this example, Plate xii, fig. 3.

No. 2. Huntingdonshire. Bred 15.vi.1938 (Brood H.D.S./L/37).

No. 3. Huntingdonshire origin. Bred June 1940 by Dr H. D. Smart.

No. 4. Huntingdonshire origin. Bred June 1940 by Dr H. D. Smart.

No. 5. Huntingdonshire origin. Bred June 1938 by Dr H. D. Smart.

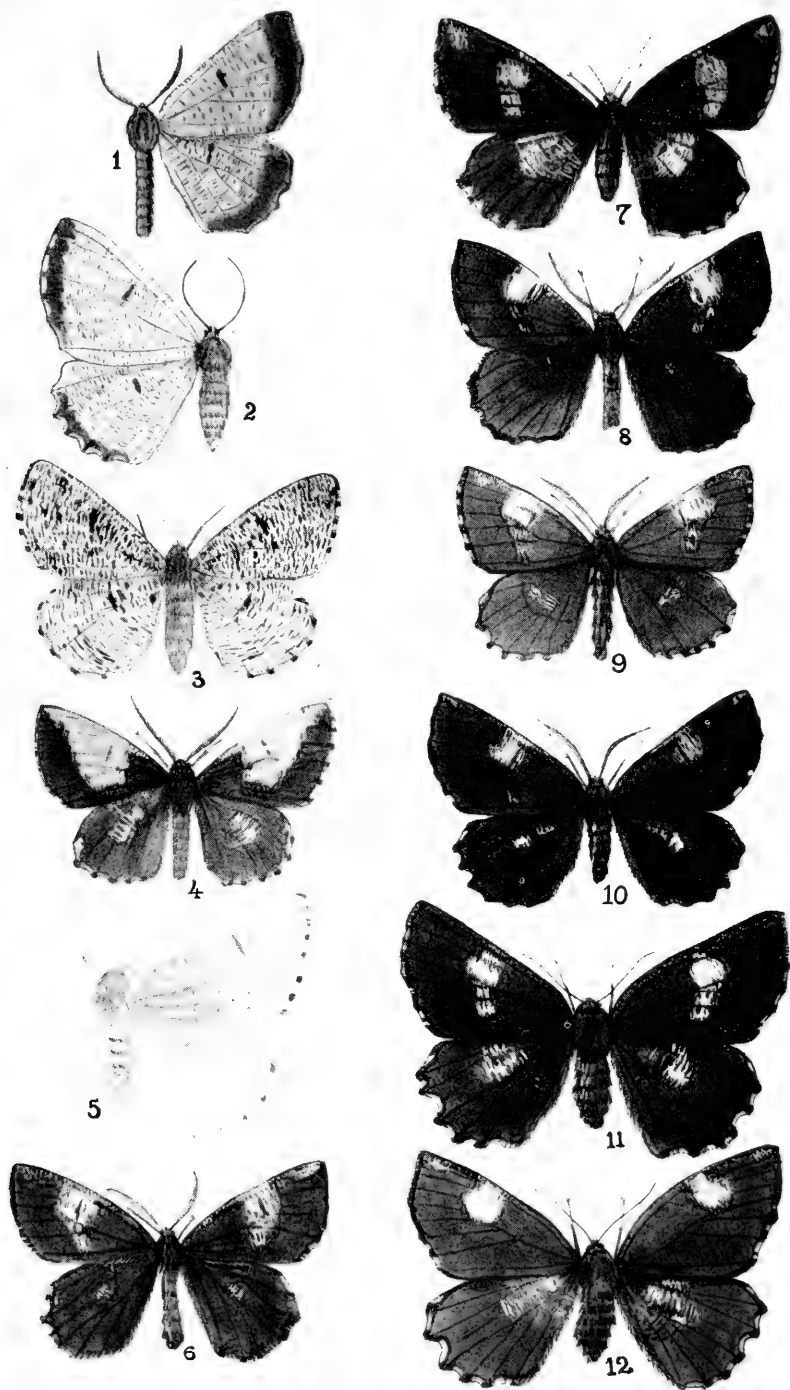
No. 6. Huntingdonshire origin. Bred June 1938 by Dr H. D. Smart.

No. 7. Huntingdonshire origin. Bred June 1938 by Dr H. D. Smart.

EXPLANATION OF PLATE XIII.

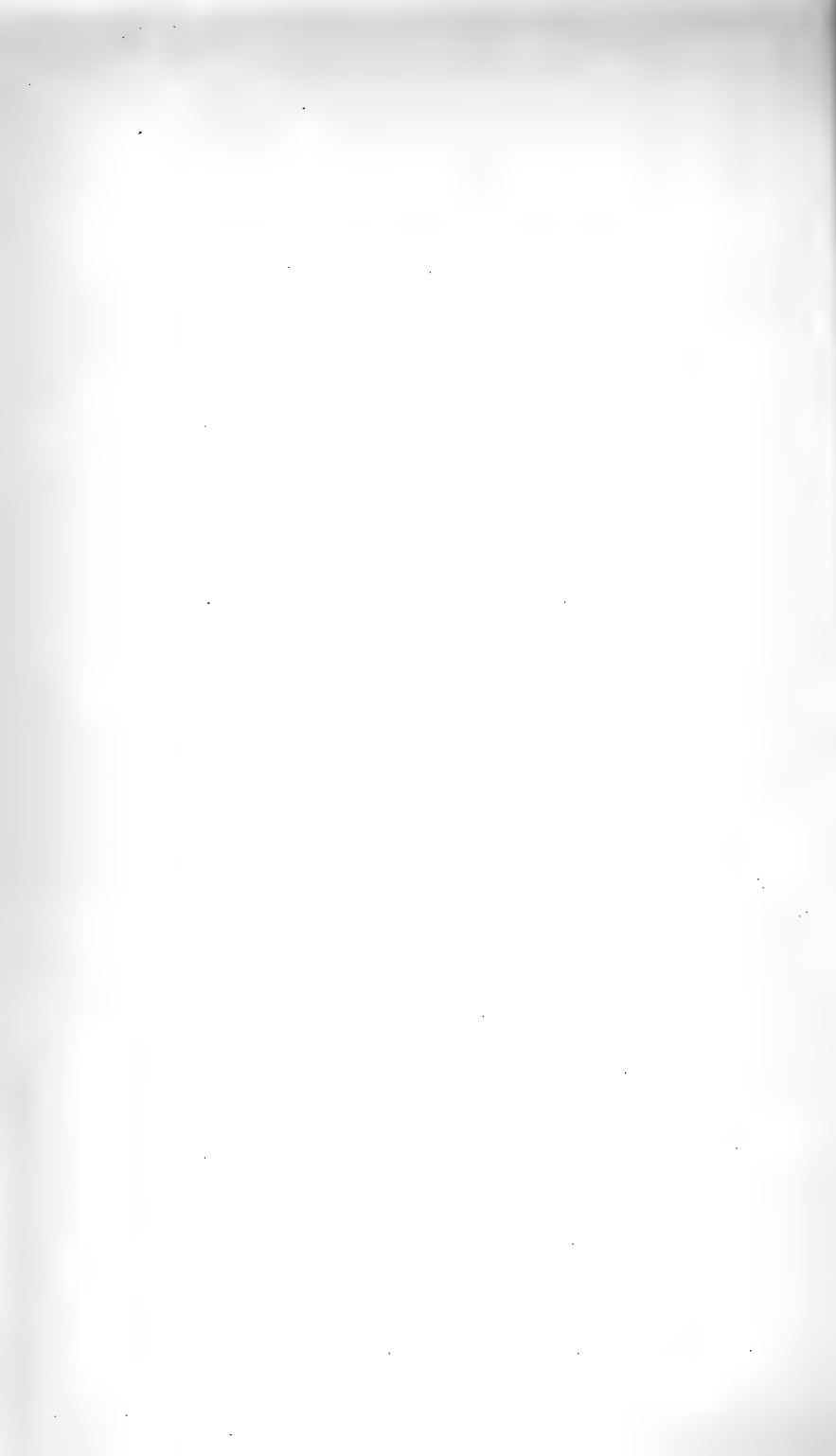
- Fig. 1. *Angerona prunaria* L. ab. *nigrolimbata* de Joannis. ♂.
France.
- Fig. 2. *Angerona prunaria* L. ab. *nigrolimbata* de Joannis. ♀.
France.
- Fig. 3. *Angerona prunaria* L. ab. *pluriguttata* Williams. ♀ allotype.
Chingford. Ex coll. C. Fenn.
- Fig. 4. *Angerona prunaria* L. ab. *juncta* Williams. ♂ holotype.
Folkestone. Bred 1892. Ex coll. Baldock.
- Fig. 5. *Angerona prunaria* L. aberration. ♀. Locality unknown.
Ex colls. Mason and Fenn.
- Fig. 6. *Angerona prunaria* L. ab. *smartaria* Williams. ♂ holotype.
Sussex origin. Bred 17.vi.1938 by H. B. Williams (Brood
H.D.S./I/37).
- Fig. 7. *Angerona prunaria* L. ab. *smartaria* Williams. ♀ allotype.
Sussex origin. Bred 24.vi.1938 by H. B. Williams (Brood
H.D.S./I/37).
- Fig. 8. *Angerona prunaria* L. ab. *smartaria* Williams. ♂ paratype
No. 2. "Hunts. × Sussex." Bred June 1942 by Dr H.
D. Smart.
- Fig. 9. *Angerona prunaria* L. ab. *smartaria* Williams. ♂ paratype
No. 7. Sussex origin. Bred 23.vi.1939 by H. B. Wil-
liams (Brood L/38).
- Fig. 10. *Angerona prunaria* L. ab. *smartaria* Williams. ♂ paratype
No. 9. "Hunts. × Sussex." Bred June 1942 by Dr H.
D. Smart.
- Fig. 11. *Angerona prunaria* L. ab. *smartaria* Williams. ♀ paratype
No. 25. "Hunts. × Sussex." Bred June 1941 by Dr H.
D. Smart.
- Fig. 12. *Angerona prunaria* L. ab. *smartaria* Williams. ♀ paratype
No. 29. "Hunts. × Sussex." Bred June 1942 by Dr H.
D. Smart.

All except Figs. 1 and 2 in H. B. Williams coll.



H. B. Williams del.

ABERRATIONS OF *ANGERONA PRUNARIA*.



No. 8. Huntingdonshire origin. Bred June 1938 by Dr H. D. Smart.

Nos. 9-13. Dunsfold origin. Bred 6.vi.1939 (Brood 2A/38) by H. B. Williams.

Nos. 1-13 in H. B. Williams coll.

Nos. 14 and 15. "Hunts. \times Sussex." Bred June 1939 by Dr H. D. Smart (Brood X).

No. 16. "Hunts. \times Sussex." Bred June 1939 by Dr H. D. Smart (Brood U).

Nos. 17 and 18. "Hunts. \times Sussex." Bred June 1939 by Dr H. D. Smart (Brood V).

No. 19. "Hunts. \times Sussex." Bred June 1940 by Dr H. D. Smart.

No. 20. "Hunts. \times Sussex." Bred June 1941 by Dr H. D. Smart.

No. 21. North Kent, July 1918. Bred.

Nos. 14-21 in E. A. Cockayne coll.

No. 22. "Hunts. \times Sussex." Bred June 1939 by Dr H. D. Smart.

No. 23. "Hunts. \times Sussex." Bred June 1940 by Dr H. D. Smart.

No. 24. "Hunts. \times Sussex." Bred June 1942 by Dr H. D. Smart.

Nos. 22-24 in National Collection, British Museum.

♀ paratypes.

No. 25. "Hunts. \times Sussex." Bred June 1942 by Dr H. D. Smart. In National Collection, British Museum.

No. 26. Dunsfold origin. Bred 11.vi.1939 (Brood 2A/38) by H. B. Williams.

No. 27. Dunsfold origin. Bred 18.vi.1939 (Brood 2A/38) by H. B. Williams.

No. 28. Huntingdonshire origin. Bred 18.vi.1938 (Brood H.D.S./M/37) by H. B. Williams.

No. 26-28 in H. B. Williams coll.

4. Ab. **pluriguttata** ab. nov.

This form is distinguished from *prunaria* by the very heavy speckling. It was bred freely some years ago by L. W. Newman and by C. P. Pickett, who published (*Ent. Rec.*, 15: 144; *Trans. City of London Ent. and Nat. Hist. Soc.*, Part XV (1905) 59) notes on his results. Although these notes are not entirely satisfactory the form appears to be a simple recessive.

Male. The fuscous striae are very numerous and are broadened and are also lengthened and confluent, except, in the majority of examples, in a small area at the apex of the forewings, which area very frequently remains of the normal ground colour in ab. *corylaria*. The aberration is variable, some examples being much darker than others, and in extreme examples the insect might almost equally well be described as fuscous with light markings.

Female. Similar, but less heavily marked with fuscous

♂ holotype. London. Bred July 1903. H. B. Williams coll. Ex coll. C. Fenn. I figure this example, Plate xii, fig. 6.

♀ allotype. Chingford. H. B. Williams coll. Ex. coll. C. Fenn. I figure this example, Plate xiii, fig. 3.

♂ paratypes.

No. 1. Epping Forest. Bred by L. W. Newman, 1905.

No. 2. Epping. Bred by E. Goodwin, June 1906.

No. 3. Bexley, Kent. Bred by L. W. Newman, 1904. Ex coll. H. Willoughby Ellis.

No. 4. Chepstow, Mon., 1898, A. T. Mitchell

Nos. 1-4 in H. B. Williams coll.

No. 5. Epping. Bred vi.1911 by E. Goodwin.

No. 6. North Kent. Bred vi.1921 by L. W. Newman.

No. 7. "Epping × Oxshott." Bred 19.vi.1906 by J. Greenwood.

No. 8. "Epping × Oxshott." Bred 21.vi.1906 by J. Greenwood.

No. 9. Epping. Bred by P. H. Tautz. (A very dark example).

Nos. 5-9 in E. A. Cockayne coll.

♀ paratypes.

No. 10. Epping. Bred July 1908. Ex Pether coll.

No. 11. Epping. Bred 1907. Ex Mathew coll.

No. 12. North Kent. Bred 1912 by L. W. Newman. Ex coll. H. Willoughby Ellis.

Nos. 10-12 in H. B. Williams coll.

No. 13. Epping. Bred vii.1908 by E. Goodwin.

No. 14. North Kent. Bred vi.1921 by L. W. Newman.

No. 15. Epping Forest. Bred 1905 by L. W. Newman.

No. 16. Epping Forest. Bred 1905 by L. W. Newman.

Nos. 13-15 in E. A. Cockayne coll.

5. Ab. **diluta** ab. nov.

This is a form in which parts of the wing are of a bone colour, as though bleached. These pale areas are not symmetrical, but in all those in my possession both sides of the insect are affected. In some examples only the fore wings, in others both fore and hind wings, are affected. I know of two female examples but all the other examples I have examined are males. A male example from Rosenthal, near Leipzig, is figured in *Iris*, 18, Pl. 11, fig. 10. This aberration appears not to occur in *corylaria*; Dr Cockayne refers (*in litt.*) to a brood reared by Dr Smart, in which most, if not all, of the male *prunaria* were *diluta*, but none of the *corylaria* were.

♂ holotype. "Hunts. × Sussex." Bred June 1941 by Dr H. D. Smart. H. B. Williams coll. I figure this example, Plate xii, fig. 7.

♀ allotype. "Hunts. × Sussex." Bred June 1939 by Dr H. D. Smart.
H. B. Williams coll.

♂ paratypes.

No. 1. Arlington, Sussex. Bred June 1907 by L. W. Newman.

No. 2. Arlington, Sussex. Bred June 1907 by L. W. Newman.

No. 3. North Kent. Bred June 1942 by L. W. Newman.

No. 4. Bevills Wood. Bred 28.vi.1927 by Rev. G. H. Raynor.

Nos. 5-8. "Hunts. × Sussex." Bred June 1942 by Dr H. D. Smart.

No. 9. "Hunts. × Sussex." Bred June 1941 by Dr H. D. Smart.

Nos. 10-11. "Hunts. × Sussex." Bred June 1939 by Dr H. D. Smart.

No. 12. "Hunts. × Sussex." Bred June 1941 by Dr H. D. Smart.

Nos. 1-12 in H. B. Williams coll.

No. 13. "Hunts. × Sussex." Bred June 1942 by Dr H. D. Smart.

Nos. 14-15. "Hunts. × Sussex." Bred June 1939 by Dr H. D. Smart.

No. 16. "Hunts. × Sussex." Bred June 1942 by Dr H. D. Smart.

No. 17. North Kent. Bred 12.vii.1904 by L. W. Newman.

No. 18. "Epping × Raindean Wood." Bred 1897-1916 by C. P. Pickett.

Nos. 13-18 in E. A. Cockayne coll.

6. *Ab. feminaecoloris* Valle, *Notulae Entomologicae*, 1930, 10, 40.

These are males in which the ground colour is yellow instead of orange, being almost exactly the colour of the female.

This is a rare form. I have 3 bred by C. P. Pickett of "Epping × Raindean" origin, bred between 1897 and 1916, from the Willoughby Ellis coll., one from Ireland from the same collection, and one from Monks Wood, 21.vi.1904, from the W. G. Nash coll.

7. *Ab. fuscaria* Prout, 1903, *Ent. Rec.*, 15: 150.

Prout says "The dark shade which prevails in *ab. corylaria* is here spread over the whole of the wings, producing an unicolorous infuscated aberration." Prout refers to a male from Lauban, from the Zeller coll. (now in B. M. Coll.) as the only example he has seen, and this example must therefore be regarded as the type. I have an example, which is figured by Barrett, Vol. 6, Pl. 270, fig. 1a, which is of unknown origin. It was acquired by the late Sydney Webb at the Harper sale in 1884 and was later in the Willoughby Ellis coll. Dr Cockayne tells me he has a worn male from Monks Wood, 26.vi.1920, H. A. Leeds.

I do not think this form has any relation to *corylaria*. In neither of the examples here referred to is there any trace of orange scales on microscopic examination.

These appear to be the named forms of *prunaria*. Before passing to the consideration of *corylaria* it may be well to refer to a number of names which appear to me to be synonyms.

Ab. spangbergi has been re-named several times.

Ab. subalpinaria Lambillion, 1912 (*Rev. Mens. Soc. Ent. Nam.*, 1912, 98, Pl. 11, fig. 1) is only to be distinguished by the fact that it is described from a male specimen. Lambillion says it is impossible to compare it with *spangbergi* or with *kentearia* Stdgr. I cannot think why he finds it difficult to compare the specimen he describes with *spangbergi*. *Kentearia* (Stdgr., 1892, *Iris*, 5: 375) is a subspecies from Asia which I cannot distinguish from *sibirica* Fuchs, 1889 (*Jahrb. Nass. Ver. Nat.*, 52: 145), but Staudinger says it is "dichter mit dunklen Strichelchen und Fleckchen bestreut" than *prunaria*, which appears to distinguish it from *spangbergi* and *subalpinaria*, though he does say that two examples of *spangbergi* occurred in the series.

Ab. unicoloraria von Hormuzaki, 1894 (*Ent. Nachr.*, 20: 56) is a form which only differs from *spangbergi* by having a few indistinct grey flecks. Staudinger (*Cat. Lep. Pal.*, 3rd edn., p. 330) stupidly refers this to *kentearia*. *Ab. unicolor* Matsumura, 1924-1925 (*Journ. Coll. Agric. Hokkaido Imp. Univ.*, 15: 176) is precisely the same form as *unicoloraria* and is described as unicolorous except for a few indistinct fuscous strigae at the costa and termen of the fore wings. At present I see no reason for distinguishing these forms with a few indistinct striae, which are, as indicated above, comparatively common. I find it altogether remarkable that von Hormuzaki and Matsumura have both chosen substantially the same name, *unicolor*, to describe an insect which cannot be distinguished from *spangbergi* unless by the fact that it is not, as *spangbergi* is, unicolorous.

Ab. fuscaria has also received more attention than one would have expected, having regard to its great rarity. *Ab. franckaria* Lambillion, 1912 (*loc. cit.*) is identical with *fuscaria*. *Ab. hasebroekii* Kujau, 1933 (*Int. Ent. Zeits.*, 27: 85) is substantially the same, except for a slight yellow suffusion on the veins. *Ab. luteosordida* Hörhamer, 1933 (*Int. Ent. Zeits. Guben*, 27: 293) differs little.

Before I proceed to discuss the variation of the banded form it may be well to observe that there are two distinct forms of the female, as respects ground colour. The normal female is of a pale yellow colour, but forms occur which are of a deep ochreous, almost golden, colour. I name the latter form *ab. aurea* n. *ab.* I have at present no knowledge of the genetics of this aberration, but it has appeared in several broods. I have reared and appears to segregate.

holotype. "Hunts. x Sussex." Bred June 1939 by Dr H. D. Smart. (Brood S).

paratypes.

- No. 1. "Hunts. × Sussex." Bred June 1939 by Dr H. D. Smart. (Brood S).
 No. 2. "Hunts. × Sussex." Bred June 1940 by Dr H. D. Smart.
 No. 3. "Hunts. × Sussex." Bred June 1942 by Dr H. D. Smart. I figure this example, Plate xiv, fig. 7.
 No. 4. "Hunts. × Sussex." Bred June 1942 by Dr H. D. Smart.

The banded form is *ab. corylaria* Thunberg, 1784. *Sordiana* Fuessly, 1775, is not a form of this species. *Corylaria* is dominant to *prunaria*, but as was demonstrated by Doncaster and Raynor (*Proc. Zool. Soc. Lond.*, 1906, 1: 125-129) the heterozygote is recognisable in that the orange parts show the fuscous striae of *prunaria*, which are absent in the homozygous form. It is not uncommon, however, to find homozygous forms with some striae, particularly on the veins, and it is sometimes difficult to identify these examples precisely. Figures are given by Doncaster and Raynor which sufficiently indicate the distinction between the homozygous and heterozygous forms.

Corylaria is subject to numerous modifications, the genetics of which have not yet been satisfactorily determined. The dark fuscous bands vary greatly in width, and this variation is not always uniform on the fore and hind wings. The following are the principal modifications which have come under my notice:

8. *Ab. juncta* n. ab.

A modification of *corylaria* in which the band of the ground colour in the centre of the forewings is very much widened and at the costa is confluent with the orange apical marking which is usually present except in the darkest forms of *corylaria*.

♂ holotype. Folkestone. Bred 1892. Ex Baldock coll. H. B. Williams coll. I figure this example, Plate xiii, fig. 4.

♂ paratypes.

- No. 1. "Eynesford" (? Eynsford). Bred 1910.
 No. 2. East Kent. June 1904. Ex. coll. H. Willoughby Ellis.
 No. 3. Somerset. Bred 28.vi.1913 by A. R. Hayward.
 Nos. 1-3 in H. B. Williams coll.

No. 4. "Chepstow × N. Kent." 22.vi.1899.

Nos. 5 and 6. Origin unknown. These two have a few orange scales in the outer brown border.

Nos. 4-6 in E. A. Cockayne coll.

No female of this aberration is known to me. A very fine male is figured by Millière, *Iconographie*, Vol. 1, Pl. 48, fig. 11.

9. *Ab. postfusca* n. ab.

In this rather common aberration the hind wing appears to be entirely fuscous. The fore wings of such examples may be normal *corylaria* or may be very dark. An example of the former class is figured by Barrett, Pl. 270, fig. 1f. In every example of this form which has come under my notice, including the example figured by Barrett, which is now in my collection, there are a few faint traces of orange, usually in the form of striae in the cell of the hind wings. This is true of the most extreme ab. *wenzeli* (*vide infra*) and other extreme forms, including the remarkable forms bred by the late Dr H. D. Smart in 1941, which are uniformly fuscous except for a light area at the apex.

Male and female. Like *corylaria*, but with the hind wings uniformly fuscous, with the exception of light scales, sometimes only to be perceived with a lens, usually in the cell.

♂ holotype. Arlington, Sussex. Bred June 1907 by L. W. Newman. H. B. Williams coll. I figure this example, Plate xii, fig. 8.

♀ allotype. Arlington, Sussex. Bred June 1907 by L. W. Newman. H. B. Williams coll.

♂ paratypes.

No. 1. Folkestone. Bred by Blackhall 1883. Ex Sydney Webb and H. Willoughby Ellis colls. Figured by Barrett, Pl. 270, fig. 1f. H. B. Williams coll. (I do not specify this insect as holotype because the figure is inaccurate in that the orange scales which remain on the hind wings are not shown.)

No. 2. New Forest 1928. Ex Baldock coll.

No. 3. Origin unknown. Bred ex. ov. by Hayward 19.vi.1931.

Nos. 4 and 5. Arlington, Sussex. Bred June 1907 by L. W. Newman.

No. 6. "Hunts. × Sussex." Bred June 1942 by Dr H. D. Smart.

Nos. 1-6 in H. B. Williams coll.

No. 7. "Epping × Raindean Wood." Bred June 1903 by C. P. Pickett.

No. 8. "Hunts × Sussex." Bred June 1936 by Dr H. D. Smart.

No. 9. "Hunts. × Sussex." Bred June 1936 by Dr H. D. Smart.

Nos. 7-9 in E. A. Cockayne coll.

(In the label of No. 8 the word "Hunts." is crossed out, but this has not been done in the label of No. 9. Both are labelled "Y".)

♀ paratype.

No. 10. Arlington, Sussex. Bred June 1907 by L. W. Newman. H. B. Williams coll.

10. ab. *pallidaria* Prout, 1903 (*Ent. Rec.*, 15, 149).

11. ab. *aureocincta* Oberthür, 1912 (*Et. Lép. Comp.*, 6, 274, and figured *ibid.*, 6, Pl. CLV, fig. 1498).

These forms must be considered together. Prout's description of *pallidaria* is: "Freckling absent as in ab. *spangbergi*, but the portions of the wings which are infuscated in ab. *corylaria* have a shadow of the darkening in ab. *pallidaria*—a nondescript grey shade in the ♂, a golden brown tinge in the ♀. . . . I have seen no other examples than Mr Pickett's."

Dr Cockayne has two females labelled "Epping × Raindean Wood, 1897-1916, C. P. Pickett." It is probable that these are two of the examples seen by Prout, and that they may be regarded as paratypes. This is an exceedingly rare form; the dark markings are only just perceptible and are well described as a shadow. Oberthür's insect is quite different. It is a female, the parts infuscated in *corylaria* being a deep golden brown. It is not uncommon, the exact shade of colour in the bands varying with the tone of the ground colour. Associated with it is a male form, in which the parts infuscated in *corylaria* are of the colour of putty. I believe this to be the male of *aureocincta*, and there can be no doubt whatever that this form in both sexes is distinct from the form I have referred to as *pallidaria*.

However, in Seitz, Vol. 4: 334 (1912), Prout treats *aureocincta* as a synonym of *pallidaria*, and his view is obviously entitled to more respect than that of any other writer, because he must be assumed to have seen Oberthür's figure (though one cannot be positive on this point as the figure was not published with the description) and to have identified it with *pallidaria*. On any view Prout must have seen the description of *aureocincta*. But in truth the description of *pallidaria* does not agree with the description or with the figure of *aureocincta*, and, therefore, after such hesitation as is necessary and proper, I have come to the conclusion that Prout's action in 1912 in sinking *aureocincta* to *pallidaria* is mistaken and wrong. I therefore regard the two forms as distinct, and to illustrate my views I figure both sexes of *pallidaria*, a male from Chattenden bred in 1897 by B. H. Crabtree (Plate xii, fig. 9) and a female from the Mason and Fenn colls., of unknown origin (Plate xii, fig. 10) and also both sexes of *aureocincta*, a male from Kent and a female from Brentwood, both from the Fenn coll. (Plate xiv, figs. 1, 2).

I have a female, also from the Mason and Fenn colls. and also without data, which has a shadow representing the basal band but no trace of any outer marginal band. This example is unlike any other example of *A. prunaria* known to me and I figure it, Plate xiii, fig. 5.

Pale freckling, similar in tint to the bands of *aureocincta*, occurs also in nominotypical *prunaria*. I name this form *griseoguttata* n. ab. ♂ holotype. Oxshott. Bred 2.vi.1927 by H. B. Williams. I figure this example, Plate xii, fig. 5. H. B. Williams coll.

♂ paratype. Bexley. Bred 20.vi.1926 by H. B. Williams. H. B. Williams coll.

12. *Ab. pallescens* ab. nov.

In Barrett, *Lep. Brit. Islands*, 6, Pl. 270, fig. 1d, is a figure of an insect from the Webb coll., that I once supposed to be the male of *pallidaria*, which it certainly is not. The insect is from Folkestone and was bred by Salwey in 1886. The parts infuscated in *corylaria* are of a pale yellowish grey, the remainder is a very pale yellow. This insect is now in my collection. The condition appears to be due to a scale defect.

♂ holotype. Folkestone. Bred by Salwey, 1886. Ex Webb and H. Willoughby Ellis colls. H. B. Williams coll.

♂ paratype. Chattenden, 7.vii.1894, J. W. Tutt. Ex coll. Sir Vauncey Harpur-Crewe. E. A. Cockayne coll.

13. *Ab. pickettaria* Prout, 1903 (*Ent. Rec.*, 15: 149).

I find this a difficult form. Prout's description is as follows "Basal area dark, as in *corylaria*, but its costa narrowly of the typical ground colour; central area of the ground colour, except the extreme inner margin, which is very narrowly fuscous; marginal area consisting of narrow fuscous band, pyramidal, its base at inner margin, its apex (ill-defined) just above nervure 6, this band followed by a narrow area of ground colour. Hind wings distinguished from those of ab. *corylaria* by having a blotch of the ground colour at apex."

A whole range of forms agrees generally, but few examples agree precisely, with this description. I treat as *pickettaria*, because they seem to be genetically related, examples varying from an insect resembling *corylaria* with a small patch of ground colour in the fuscous band near the hind margin to a form in which the hind margin is completely of the ground colour on fore and hind wings and the "pyramid" very much reduced. (See Plate xiv, figs. 3, 4.)

Pickettaria appears to result from the presence of a recessive gene, and can only be expressed in the presence of the *corylaria* gene. Pickett published some results in *Ent. Rec.*, 15: 144, from which it appears that by inbreeding from a pairing obtained in 1898 *pickettaria* first appeared in 1901 (p. 146). In 1903 Pickett (*Trans. City of London Ent. & N. Hist. Soc.*, 15 (1905), 59) bred 1 *pickettaria* in each of two broods (Brood 4—34 *corylaria*, 1 *pickettaria*; Brood 7—41 *corylaria*, 1 *pickettaria*). Geo. J. Grapes also (*Entom.*, 20: at p. 38) bred 1 *pickettaria*, apparently as a recessive. In 1938, from *corylaria* parents (Brood A/37) I bred 12 *prunaria*, 16 *corylaria* and 1 *pickettaria*, the insects being of Essex origin.

On a number of occasions pairings of *pickettaria* have proved infertile. My records show:

Brood G/38. *pickettaria* ♀ × *fuscipicata* ♂. Only one moth was bred, a female with slight traces of the ground colour in the outer marginal band of the fore wings.

Brood H/38. Male parent *pickettaria*, similar to the female last described. All the ova were infertile.

- Fig. 1 *Angerona prunaria* L. ab. *aureocincta* Oberthür ♂
Kent. Bred. Ex. coll. C. Fenn.
- Fig. 2 *Angerona prunaria* L. ab. *aureocincta* Oberthür ♂
Brentwood. Ex. coll. C. Fenn.
- Fig. 3 *Angerona prunaria* L. ab. *pickettaria* Prout ♂
Extreme form. Barum. Bred by G. F. Mathew, June, 1909.
- Fig. 4 *Angerona prunaria* L. ab. *pickettaria* Prout ♂
Extreme form. Barum. Bred by G. F. Mathew, June, 1909.
- Fig. 5 *Angerona prunaria* L. ab. *selectaria* Rebel ♂
New Forest. Bred by Gulliver, circa 1915. Ex. coll. P. M. Bright.
- Fig. 6 *Angerona prunaria* L. ab. *extrema* Williams ♂ holotype.
"Hunts. x Sussex". Bred June 1941 by Dr. H. D. Smart.
- Fig. 7 *Angerona prunaria* L. ab. *aurea* Williams. Paratype No. 3.
"Hunts. x Sussex". Bred June 1942 by Dr. H. D. Smart.
- Fig. 8 *Angerona prunaria* L. ab. *douglasaria* Williams. ♂ holotype.
"Hunts. x Sussex". Bred June 1942 by Dr. H. D. Smart.
- Fig. 9 *Angerona prunaria* L. ab. *smartaria* Williams. ♂ paratype No. 27.
"Hunts. x Sussex". Bred June 1942 by Dr. H. D. Smart.
- Fig. 10 *Angerona prunaria* L. ab. *bimacularia* Williams. ♂ holotype.
"Hunts. x Sussex". Bred June 1941 by Dr. H. D. Smart.

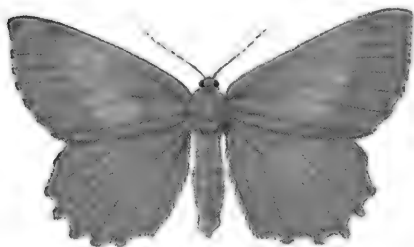
All in H. B. Williams coll.



1



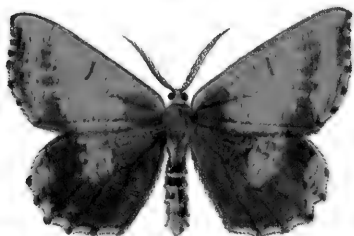
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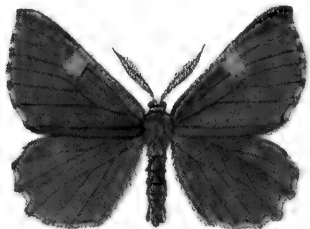
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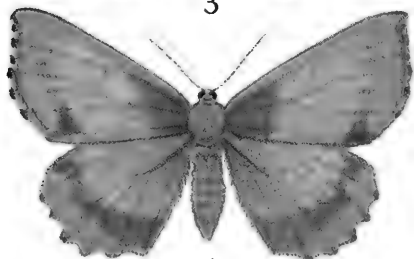
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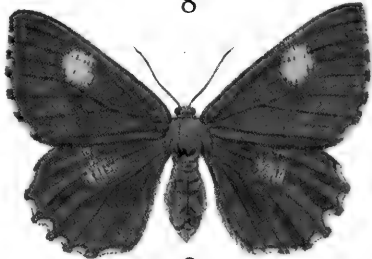
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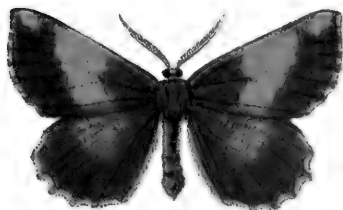
8



4



9



5



10

Miss Dorothy Fitchew del.

VARIATION OF *ANGERONA PRUNARIA* L.

Brood J/38. Female parent *pickettaria*. I bred 2 male and one female *pickettaria*, one male and one female *corylaria* and 6 male and two female *prunaria*.

Brood G/39. Female parent *pickettaria* (ex P/38); male parent *pickettaria* (J/38). Neither parent was extreme *pickettaria*. All the ova were in vtile.

Brood P/39. Female parent *pickettaria* (J/38); male parent *fuscapicata* (2C/38). A few larvae hatched but no moths were bred.

Brood O/39. Female parent *pickettaria* (G/38, described above). A few larvae hatched but no moths were bred.

Thus these six pairings gave only one moderately healthy brood. On the other hand, *pickettaria* has been bred in three successive generations. I think, however, that my results, even allowing for the fact that pairings of *prunaria* are occasionally infertile, are too consistent to be fortuitous, and pending further investigation I conclude that the *pickettaria* gene is associated with a lethal factor. The small number of *pickettaria* segregating in broods in which the form occurs appears to be consistent with this view.

So far as I can judge from the incredibly poor figure, ab. *infuscata* Matsumura, 1925 (*Journ. Coll. Agric. Hokkaido Imp. Univ. Japan*, 15: 176, Pl. X, fig. 23) is identical with *pickettaria*.

14. Ab. *selectaria* Rebel, 1914, *Ver. zool-bot. Ges. Wien.*, 64: 156, (Vienna, 1914), and fig. 3.

"Fore wing with a large basal blotch, extending to the dark central lunule, rounded on the outer side, followed by a pure ochre-yellow central band becoming narrower towards the inner margin, with a very narrow line towards the base but not reaching the base of the wing. The outer marginal area smoky brown, widely extended, with an ochre-yellow apical spot.

"The hind wing ochre-yellow with a dark central lunule and a very wide smoky brown marginal band. While the ochre-yellow parts of the fore wing are free from dark speckling, some brown speckling occurs in the somewhat darkened basal area of the hind wing towards the inner margin and towards the costa.

"The fringes of all wings smoky grey with yellow spots."

The description and figure relate to a male specimen, and two were taken in Bosnia by H. Fritsch in June 1908.

This, if I have correctly identified it, is a most beautiful form, and it appears to be exceedingly rare. I have three examples, from the New Forest, bred by Gulliver circa 1905, from the P. M. Bright coll. Two of these agree exactly with the description and the pure ochre- (or golden-) yellow band on the forewings is very striking, contrasting strongly with the smooth smoky-brown bands. The third has a certain

amount of freckling and is probably heterozygous for the *corylaria* character. Dr E. A. Cockayne has other examples of similar origin. There can be no doubt that this form is altogether distinct from that next mentioned, the colour of the pale parts being almost intermediate between the normal and female colours. I figure an example, Plate xiv, fig. 5.

15. *Ab. ochreata* Schawerda, 1922 (*Ver. zool-bot. Ges. Wien.*, 72: 91, Vienna, 1922).

"While the aberration *sordida* Fuessl. bears red bands, those of the *ab. ochreata* are ochre-coloured. The extreme of this form (ochre-coloured spot on the costa but the band obsolescent) is figured in this *Verhandlungen* 1921 as '*ab. wenzeli* Schaw.'"

This name thus applies to the male *corylaria* in which the bands are more or less of the female coloration, and corresponds to *ab. feminae-coloris* of *prunaria*. This is not an uncommon form. I have an example from Monk's Wood, 18.vi.1909.

16. *Ab. wenzeli* Schawerda, 1922 (*Zeits. Ost. Ent.-Ver. Vienna*, 7: 19, 1922).

"A ♂ from North Tyrol obtained by Major Wenzel of Innsbruck is wholly brown and shows only an orange-yellow spot on the costa as sole remnant of the broad orange-red band. . . . I have figured this beautiful aberration, not described by Prout and Rebel, on this coloured Plate, fig. 2."

The figure of *wenzeli* shows a male, wholly brown except for an orange-yellow spot on the costa of the fore and hind wings and a slight trace of orange on the inner margin of the forewings. It is thus an example of one of the darkest forms of *corylaria*, a male, with the ground colour of the female. I have seen no comparable example.

A very considerable range of dark forms of *corylaria* were bred in the years immediately preceding the late war by Dr H. D. Smart and by those who had the privilege of receiving stock from him. It has been customary in some places to treat these forms as *wenzeli*, but this is clearly inaccurate; *wenzeli* has not the normal ground colour of the male and no female is described. I therefore find it necessary to describe Dr Smart's forms under new names. These appear to be modifications of *corylaria* and are probably multifactorial. I think it desirable to differentiate three of the most extreme forms and to describe the remainder, which correspond very closely to *wenzeli* except in the ground colour, under one name.

17. *Ab. extrema* n. ab.

Male, wholly fuscous with the exception of an orange apical mark and traces of orange striae on the costa of the fore wings and at the distal end of the cell of both fore and hind wings. Fringes brown, chequered with pale orange.

♂ holotype. "Hunts. x Sussex," bred June 1941 by Dr H. D. Smart. I figure this example, Plate xiv, fig. 6. It will be observed

that the traces of orange are slightly more pronounced on the right side. H. B. Williams coll.

♂ paratype. "Hunts. × Sussex," bred June 1941 by Dr H. D. Smart. In this example there are rather pronounced traces of orange at the apical end of the cell of the fore wings. E. A. Cockayne coll.

18. Ab. **bimacularia** n. ab.

Male, fore wings fuscous with the exception of an orange apical mark, a small orange spot at the distal end of cell and a few orange striae on costa. Hind wings fuscous with the exception of scattered orange scales in the cell. Fringes brown, chequered with pale orange.

♂ holotype. "Hunts. × Sussex," bred June 1941 by Dr H. D. Smart. I figure this example, Plate xiv, fig. 10. H. B. Williams coll.

♂ paratype. "Hunts. × Sussex," bred June 1941 by Dr H. D. Smart. This is asymmetrical, the orange markings being reduced on left fore wing and increased on left hind wing.

19. Ab. **douglasaria** n. ab.

Male, wholly fuscous with the exception of a very small spot of orange immediately beyond the cell of fore wings. Apical blotch absent. A few scattered dots or striae of orange on costa of fore wings. Fringes brown, chequered with pale orange.

♂ holotype. "Hunts. × Sussex," bred June 1942 by Dr H. D. Smart. I figure this example, Plate xiv, fig. 8. On the hind wing there are one or two orange scales in the cell, only to be perceived with a powerful lens. H. B. Williams coll.

♂ paratype. Dartford, bred June 1906 by the Rev. G. H. Raynor (Doncaster's strain). On hind wings an area with orange scales in cell, but much less extensive than in the fore wings. E. A. Cockayne coll.

20. Ab. **smartaria** n. ab.

The genetics of these dark forms of *corylaria* cannot yet be explained satisfactorily, and until it is possible to determine their genetic constitution I think it desirable to describe the ordinary dark forms bred by Dr Smart and by others who received larvae from him under a single name. I apply the name to all dark forms of *corylaria* pattern in which the central band of ground colour on the fore wings is reduced. The hind wing may be entirely fuscous except for a few orange scales, as in ab. *postfusca*.

Male. Fore wing. As in *corylaria*, but with the central band reduced, particularly towards the inner margin, where it may be completely, or almost completely, absent as far as the lower edge of the cell. The apical blotch sometimes absent. *Hind wing.* The orange markings reduced, or absent except for a few scattered scales.

Female. - Fore wing. The central band narrow; sometimes obsolescent towards inner margin. Apical blotch sometimes absent. *Hind wing.* The yellow markings reduced and the marginal fuscous band very wide.

♂ holotype. Sussex origin. Bred 17.vi.1938 (Brood H.D.S./I/37) by H.B.W. H. B. Williams coll. I figure this example, Plate xiii, fig. 6.

♀ allotype. Sussex origin. Bred 24.vi.1938 (Brood H.D.S./I/37) by H.B.W. H. B. Williams coll. I figure this example, Plate xiii, fig. 7.

♂ paratypes.

No. 1. "Hunts. × Sussex." Bred 9.vi.1940 by Dr H. D. Smart. This example is generally similar to the holotype.

No. 2. "Hunts. × Sussex." Bred June 1942 by Dr H. D. Smart. I figure this example, Plate xiii, fig. 8.

No. 3. "Hunts. × Sussex." Bred June 1942 by Dr H. D. Smart. This example is generally similar to the preceding, except that the apical blotch is present, the costal part of the central band is triangular, the apex joining the remains of the lower part of the band, and there is more orange on the hind wings.

No. 4. Sussex origin. Bred 19.vi.1938 (Brood H.D.S./I/37) by H.B.W. This example is generally similar to the holotype, except that the band on the fore wing is very slightly wider and the apical blotch is smaller.

No. 5. Sussex origin. Bred 21.vi.1938 (Brood H.D.S./I/37) by H.B.W. Similar to the preceding but the veins below the cell on fore wings much infuscated and more orange scaling on the hind wings.

No. 6. Sussex origin. Bred 15.vi.1938 (Brood H.D.S./I/37) by H.B.W. Very similar to the preceding.

No. 7. Sussex origin. Bred 23.vi.1939 (Brood L/38) by H.B.W. I figure this example, Plate xiii, fig. 9.

No. 8. Sussex origin. Bred 29.vi.1939 (Brood L/38) by H.B.W. This example is generally similar to the preceding, but has a small orange patch on the hind wings.

No. 9. "Hunts. × Sussex." Bred June 1942 by Dr H. D. Smart. I figure this example, Plate xiii, fig. 10.

No. 10. "Hunts. × Sussex." Bred June 1941 by Dr H. D. Smart. This example is generally similar to the preceding, but has rather less orange on fore wings and the hind wings are almost uniformly fuscous.

Nos. 1-10 in H. B. Williams coll.

No. 11. Sussex. Bred by Dr H. D. Smart, 1927. This example is very similar to the holotype.

- No. 12. "Hunts. \times Sussex." Bred by Dr H. D. Smart, June 1939. (Brood R.) Very similar to the holotype.
- No. 13. "Hunts. \times Sussex." Bred June 1940 by Dr H. D. Smart. Apical blotch absent. Band on fore wings represented by a costal spot and traces of the inner part of the band. Hind wings with small orange areas in cell.
- No. 14. "Hunts. \times Sussex." Bred June 1940 by Dr H. D. Smart. Fore wing band present but much reduced, Traces of orange on hind wings.

Nos. 11-14 in National Collection, British Museum.

- No. 15. "Hunts. \times Sussex." Bred June 1940 by Dr H. D. Smart. Very similar to No. 14.
- No. 16. "Hunts. \times Sussex." Bred June 1940 by Dr H. D. Smart. Very similar to the preceding.

Nos. 15 and 16 in Oxford University Museum.

- No. 17. "Hunts. \times Sussex." Bred June 1940 by Dr H. D. Smart. Similar to the holotype but slightly darker.
- No. 18. "Hunts. \times Sussex." Bred June 1939 by Dr H. D. Smart. (Brood Q.) Similar to the preceding, but the orange areas on fore and hind wings reduced.
- No. 19. "Hunts. \times Sussex." Bred June 1939 by Dr H. D. Smart. (Brood N.) Fore wings similar to No. 17, but apical blotch reduced to a few scales. Hind wing with a few orange scales only.
- No. 20. "Hunts. \times Sussex." Bred June 1941 by Dr H. D. Smart. Fore wing similar to the preceding but central band below cell represented only by a narrow line of orange scales. Discoidal large. A few orange scales visible on hind wings.
- No. 21. "Hunts. \times Sussex." Bred June 1940 by Dr H. D. Smart. Similar to No. 9. Orange spot on fore wing external to discoidal. No orange scales on hind wings visible to the naked eye.
- No. 22. "Hunts. \times Sussex." Bred June 1942 by Dr H. D. Smart. Similar to the preceding but without apical blotch.

Nos. 17-22 in E. A. Cockayne coll.

♀ paratypes.

- No. 23. Sussex origin. Bred 3.vii.1938 (Brood H.D.S./F/37) by H.B.W. Similar in marking to the allotype but with very small apical blotch. Ground colour pale yellow.
- No. 24. "Hunts. \times Sussex." Bred June 1940 by Dr H. D. Smart. Similar to the preceding, but with narrower band on fore wings, partly obsolete on right side.
- No. 25. "Hunts. \times Sussex." Bred June 1941 by Dr H. D.

Smart. Similar to the preceding but with bands obsolescent towards inner margin. Apical blotch absent. I figure this example, Plate xiii, fig. 11.

No. 26. "Hunts. \times Sussex." Bred by Dr H. D. Smart, June 1941. Similar to the preceding, but bands more obsolete especially on the right side.

No. 27. "Hunts. \times Sussex." Bred June 1942 by Dr H. D. Smart. Band on fore wings reduced to a costal spot with a few scattered scales below. Apical blotch almost obsolete. Hind wings with traces of band in costal part. I figure this example, Plate xiv, fig. 9.

No. 28. Origin as No. 27. Similar, but of rather lighter colour.

No. 29. Origin as No. 27. Similar, but darker. I figure this example, Plate xiii, fig. 12.

No. 30. "Hunts. \times Sussex." Bred June 1940 by Dr H. D. Smart. Similar to No. 26, but with lighter hind wings.

Nos. 23-30 in H. B. Williams coll.

No. 31. "Hunts. \times Sussex." Bred June 1941 by Dr H. D. Smart. Similar to the allotype but rather darker. Fuscous parts intense dark brown. Apical blotch absent.

No. 32. Sussex origin. Bred June 1939 by Dr H. D. Smart. Very similar to the preceding but of less intense colouring.

Nos. 31 and 32 in National Collection, British Museum.

No. 33. "Hunts. \times Sussex." Bred June 1939 by Dr H. D. Smart. (Brood N.) Similar to No. 31, but of paler colouring.

No. 34. Sussex origin. Bred July 1929 by Dr H. D. Smart. Similar to the preceding, but of still paler colouring and with traces of the apical blotch.

Nos. 33 and 34 in Oxford University Museum.

No. 35. "Hunts. \times Sussex." Bred June 1941 by Dr H. D. Smart. Dark brown. Apical mark reduced to a few light scales. Fore wings with a round spot external to discoidal and two small spots below. Hind wings with small yellow area external to discoidal.

No. 36. "Hunts. \times Sussex." Bred June 1939 by Dr H. D. Smart. (Brood C.) Light brown. No apical blotch. Fore wings similar to No. 35 but with one spot only below the round spot. Hind wings with yellow extending within discoidal.

No. 37. "Hunts. \times Sussex." Bred June 1941 by Dr H. D. Smart. Medium brown. Fore wings with small round spot external to discoidal and no other marking except apical blotch. Hind wings with oval pale area divided by

discoidal and a few scattered pale scales between this pale area and the inner margin.

Nos. 35-37 in E. A. Cockayne coll.

I dedicate the two aberrations last described to the memory of Herbert Douglas Smart, M.C., M.D., B.S., who for many years reared large numbers of this species, and to whose generosity so many entomologists owe their series of these interesting aberrations. But for his kindness this paper could not have been written, and it will be obvious from a perusal of what I have been able to write that had he survived to take the personal interest he most assuredly would have taken in its production his great knowledge and experience of the insect and of breeding its aberrations would have enabled me to avoid many of the shortcomings of which I am conscious. It seems very appropriate that two of the most characteristic of the new forms described should bear his name.

Much remains to be done in the study of the genetics of *Angerona prunaria*, more, indeed, than any one entomologist can hope to accomplish. My own studies were grievously interrupted by the war and I now see no hope of resuming them on their former scale, at any rate for many years to come. I hope that what I have written may inspire some members of this Society to undertake the experimental breeding of the species, and it would be most interesting if any who are fortunate enough to meet with such aberrations as *aurea*, *aureocincta*, *pallidaria*, *pickettaria* or *smartaria* would breed from them and publish their results. The species is most easily reared. The larvae should be fed in the ordinary glass-topped tins until after the first moult, when they may be sleeved on the ordinary garden privet until hibernation. If a reasonably large sleeve is used they should not require to be re-sleeved more than once. In my experience they will hibernate quite successfully in the sleeves if some dry leaves are placed therein about the middle of October, but they will no doubt hibernate very well indeed in cages indoors if supplied with cut stems of privet. It is convenient to give them cut stems of lilac when the time for pupation comes, as they form their puparia very readily of two of these large leaves spun together. They should be removed from the puparia before emergence.

It will be very clear from a perusal of what I have written that I have received very great assistance from Dr E. A. Cockayne in the preparation of this paper. My debt to him is even greater than that. He has verified references for me on many occasions and I have received constant advice and encouragement from him. It is therefore appropriate that I conclude this paper with an expression of my gratitude to him for all his help.

SPRING FLOWERS OF CAPE PENINSULA.

By Miss W. M. A. BROOKE, F.L.S.

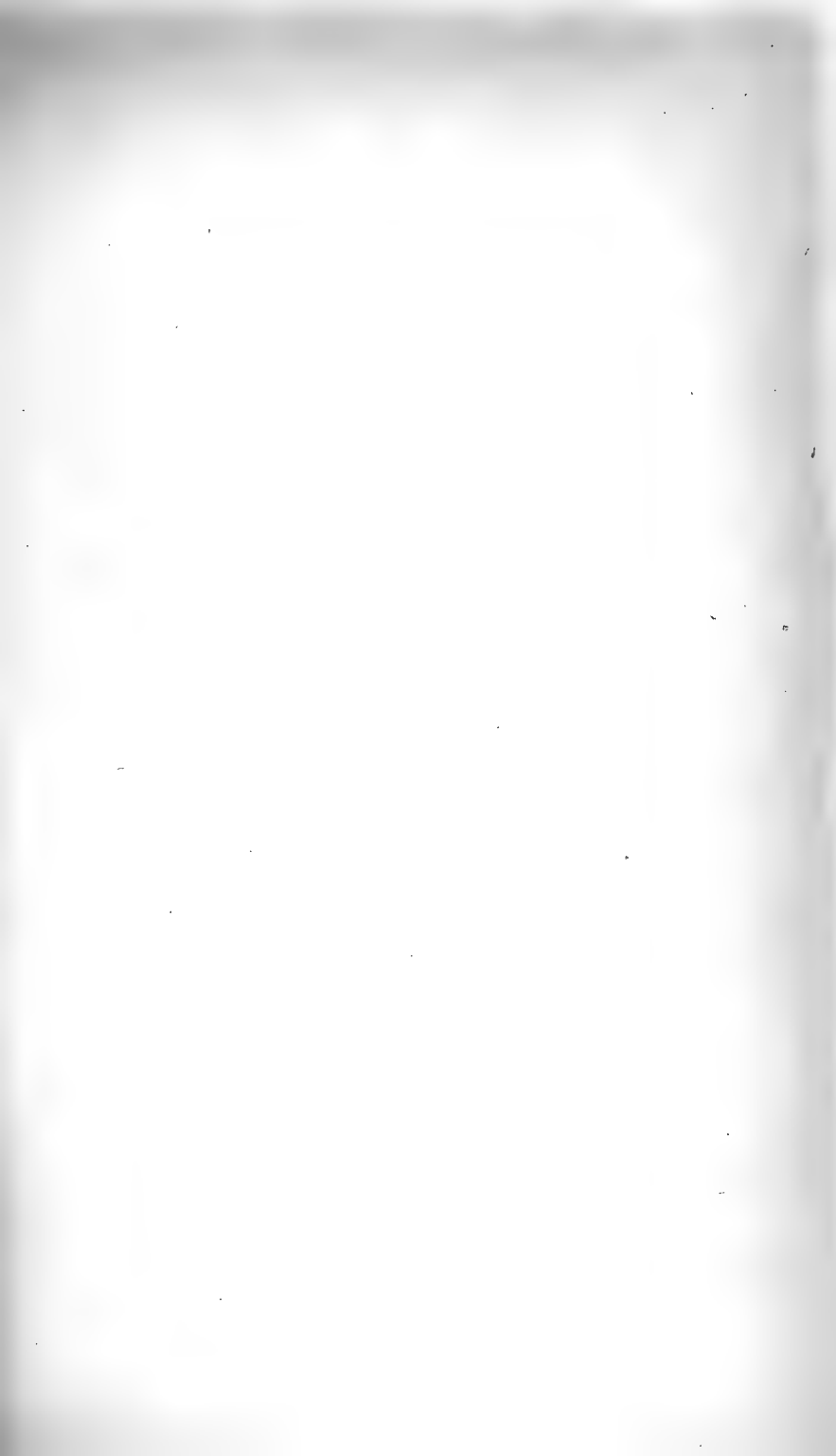
Read 24th July 1946.

I arrived at Cape Town at the end of August 1936, having sailed from the Canary Isles three weeks after the outbreak of the Spanish Civil War. As the situation there seemed unsettled, I left hurriedly on an earlier boat than I had intended. We docked about 3 p.m. and I was told that as the banks were already closed and my name was not on the list of those for whom they had guarantees I could not leave the ship. So until ten o'clock the next morning I had to stop on a deserted boat and admire the corrugated iron shacks of the port while a sturdy guard was placed at the gangway to prevent my escape. Next day the authorities, having discovered the guarantee at the bank, were polite and apologetic, but the shipping company deducted the guard's wages for the night from my deposit!

I landed at the close of the South African winter, which on the S.W. is the wet season, just at the beginning of the lovely Cape spring, and stopped for a month, as I had been advised to do, at a hostel for lady gardeners working in the Kirstenbosch Botanic Gardens, which lie on the landward side of Table Mountain.

The Cape Peninsula stretches many miles South of Cape Town. Table Mountain, its backbone, gradually sinking to low rolling slopes. It is no great width and originally must have been an island cut off from the mainland by a stretch of ocean some 20 miles across, which, when it receded, left a wide expanse of sand, the Cape Flats. These were the cause of constant dust storms, and various unsuccessful efforts were made to fix them until at last they were planted with Australian wattle or mimosa. This seems to be holding them firm and is exceedingly beautiful when covered with golden blossom. On the Atlantic side of Table Mountain are a number of attractive seaside resorts, while on the landward slopes nestle a series of suburbs with the Government buildings, the University, and, seven miles out, the Kirstenbosch Gardens. These last are unique for they contain only South African wild plants. The gardens are artistically laid out in the midst of wonderful natural surroundings and are a training ground for men and women gardeners in ordinary garden work and the collecting and packing of seeds. Subscribers to the South African Botanical Society either in South Africa or overseas are sent seeds from the gardens annually.

The hostel lay in the centre of light woods that I do not think were indigenous. As already mentioned, I arrived at the beginning of the Cape spring, that is at the end of August. Everything was fresh and green, ditches we passed in the car were full of arum lilies, buds were bursting on deciduous trees, and the flowers were beginning to open.



EXPLANATION OF PLATE XV.

1. *Podalyria calyptrata*.
2. *Morea tripetaloides*.
3. *Erica purpurea* Andr.
4. *Erica Cerinthoides*.
5. *Albuca* sp.
6. *Leonotis Leonurus*.
7. *Lobelia coronopitolia*.
8. *Mimetes lyngea* Knight.
9. *Gladiolus* sp.
10. *Disa graminifolia* Ker.
11. *Roella ciliata* Linn.
12. *Erica Plukenetii* L.
13. *Erica pulchella*.
14. *Sarcocolla nervosa*.
15. *Sutherlandia frutescens*.
16. *Helipterum gnaphaloides* DC.
17. *Harveya purpurea* Hary.
18. *Erica brunoides* L.



W. M. A. Brooke del.

SPRING FLOWERS OF CAPE PENINSULA.

When you first come to Cape Town all the flowers seem to be new. The only familiar plants are those we know in greenhouses or cottage windows or a few that have been introduced from Europe. It is not merely that they are unfamiliar species. Most of the genera and some of the orders are hardly seen in England even at the R.H.S. shows. For a month I worked on my Canary Isles sketches and specimens, and wandered around enjoying the countryside. By October spring was at its height and the flowers in full blossom. Instead of daisies in the lawns were the lovely large squat single-flowered pink *oxalis*, while the taller pale yellow flowers of another species of *oxalis* took the place of cowslips. Kniphofias, pelargoniums and arum "pig" lilies were scattered around. The latter in South Africa have no scent.

Many of the new plants were very strange, especially perhaps those of the order Proteaceae. Mostly they are shrubs or bushes and the Proteas themselves have tough leaves and composite flowers surrounded by a large involucre of white or coloured bracts which form a cup, the bottom of which is filled with honey and ants. The famous silver trees, *Leucadendron argenteum*, belong to this order though their leaves, covered with silky hairs, are softer than is usual.

The hostel was too far out to be very satisfactory, and I was never able to explore the plateau on the top of Table Mountain (3500 ft.), which has a flora of its own. I climbed to it twice but had to return almost at once.

Mr and Mrs Middlemost, who had their home in the gardens, were exceedingly kind in taking me for long drives and picnics. We crossed the Flats one day to the mountains beyond and when I left Mr Middlemost drove me to Simonstown and later on to Smith's Farm.

The Proteas were scattered over the Peninsula but were nearly over by the spring. The lovely little Sugar Birds feed on the honey and insects the Proteas hold. They vary in size from that of a Blue Tit to that of a Greater Tit or even larger. They are the shape of a Humming Bird and the males have mostly bright metallic colouring. All of them have long curved beaks and cylindrical tongues for sucking honey. They perch on the side of a *Protea* and then take a header into the flower from which you will see nothing but a bit of tail sticking up. Leucadendrons are also Proteaceae but the flowers are in heads not cups. A greenish species is very common. *Mimetes* also belongs to the order.

All over the place were varieties of *Pelargonium*, so many I did not try to paint them. Compositae, too, were very plentiful and beautiful but one small cushiony mass of grey *Helipterum gnaphaloides* would be passed by were it not for its glorious scent. Another very sweet smelling plant was the sweet pea bush, *Podalyria calyptrata*. It was covered with pink flowers the size and shape of a sweet pea and with just as fine a scent. Another leguminous plant straggles over the ground. It is *Sutherlandia frutescens* and has coloured inflated seed pods called "gansies" or "goslings" by Boer children, who race them

on pools. *Cyclopea* in patches is rather like our gorse without the prickles.

Since South African plants have to survive a hot dry season six months in length, there are a large number of bulbous or tuberous plants: Iridaceae, Orchidaceae or Amaryllidaceae. Although many of them look like little irises they are all allied genera: *Morea*, *Homeria*, *Helyxera*. They are very dainty and delicate but grow on long straggling stalks that spoil their beauty. Several species of *Ixias* are to be found: *lutea* is very common and pretty. *Hypoxis stellata* is another yellow flower that is plentiful. *Albuca* is another common flower rather like a large yellow or white snowdrop.

Near Smith's Farm I found a lovely little "Painted Lady," one of the miniature gladioli. The flower is quite small but very dainty. There are a large number of these tiny *Gladiolus* species along the coast and they have a charm of their own.

There are a great many ground orchids on Cape Peninsula, some not unlike our own, but mostly far more solid and impressive, although not like those we have in greenhouses. Usually they belong to the genus *Disa* or *Satyrium*, though the commonest, the little yellow "Modderkappie," is a *Pterygodium*. *Satyrium* has two long spurs to each flower. The pink *S. princeps* is tall and striking and was growing on the marsh with a bright orange relation.

There are so many *Disa* species round the Cape that the word "*Disa*" has become a synonym for orchid with the general public. The largest I saw was the Horned *Disa* (*Disa cornuta*) with a tall stiff spike of flowers, but by far the loveliest and most famous were the "Blue Disas." *D. graminifolia* had a delicately veined blue hood and a rich purple apron which in *D. barbata* was light green. A very queer plant was *Bartolina*, the spider orchid. It looks as if it were insectivorous and grows under bushes. I never found it myself but was given a flower. Labiatae are less common than with us, but the False Dagga, *Leonotis leonurus*, is plentiful. It is tall and its long orange flowers are densely covered with short hairs forming a kind of plush. I do not know the origin of its common name. Dagga itself, though wild, is a proscribed plant; it is illegal to allow it to grow or to possess it dead. *Leonotis* is beautiful and I believe harmless. At Simonstown there was a shrubby *Salvia* like a large brown dead nettle.

Everywhere one found lobelias of various species though not, I think, those we have in England. Most have long firm stems with a few blue flowers.

The veldt is covered by a tough scratchy mixture with a considerable proportion of heath and little or no grass. On Cape Peninsula there are many species of heather but few of the more striking ones found further East. Superficially they are of three types and there are numerous small-flowered species, some not unlike our own. *Erica brunoides* has a dainty flower that later becomes coated with white fluff. Then there are the bottle-shaped heaths such as *E. Plukenetii*. The

flowers are large and the stamens hang below them. The bright scarlet *E. cerinthoides* is a plant to itself. It has a big clump of flowers hanging at the tip of its stem and usually only one or two flowering stems. It is common but scattered: two plants do not seem to grow together. It is so striking that if South African people speak of *Erica* they are sure to mean this plant. Here and there I found one of the Bird Heaths plentiful further East. These plants are a few feet high and usually have their large trumpet-shaped flowers growing round the stem. The blossoms have a slight curve, just the shape to fit nicely to a Sugar Bird's beak. One of the most perfect sights is to watch the brilliantly coloured little birds darting round the heather, clinging to it perhaps upside down like a Tit, and thrusting their beaks up one flower after another drinking the nectar. In the lonelier districts they are fearless but are always on the move. *Roella ciliata* is heath-like in its growth: it has a few large gentian-shaped flowers of a soft delicate blue with darker markings. It is a great favourite of mine. *Adenandra unifolia* will be found on the veldt with white waxy blossoms.

Amongst the heathery mixture will be found here and there a *Harveya*. The members of this genus are, Dr Hutchinson tells me, saprophytes: they were formerly considered parasites. Its members have a very strong family likeness and they are as a rule very lovely. *H. capensis* has fleshy dazzling white flowers tinged with pink with reddish stalks. *H. purpurea* is pink and does not usually have so many flowers, while their texture is less fleshy.

Two more pink flowers were *Orpheum frutescens* and *Chironia jasminoides* with queerly curved styles. *Orpheum frutescens* has brightly polished flowers the size of a wild rose on a small bush, while *Chironia jasminoides* has a mass of smaller blossom. From Simonstown I went on to Smith's Farm, four miles from Cape Point, a lovely spot a mile from the Pacific and three or four from the Atlantic Ocean. The whole area is a nature reserve and there were no other houses for miles except the huts of a few fishermen. Somewhere on the hills ranged a troop of baboons but not often to be seen. I had two thrills here, one when a small buck jumped up from no great distance and the second when I nearly trod on a Tortoise that was living its own natural life. But my first thrill was when I arrived and found just inside the entrance a tree covered with Weaver Birds' nests. The yellowish birds seem to spend all their time building nests whether they need them or not. They are often built over water in order, I was told, that snakes should fall in. But since snakes can swim I cannot see why. Some Mouse Birds slept in bushes a little further on. They are a soft dark grey with pointed crests and long tails and do considerable damage to fruit.

I walked back from Smith's Farm to Kommetji and had an unusual experience on the journey. While I chatted to a little coloured girl a lorry drove by, stopped, and a white man and a coloured one descended and started beating the bush with a spade. Presently a cobra slipped into the road and reared up with its hood raised. The men

tried to hold it with a branched stick they had cut, but the snake climbed the wheel of the lorry and lay on the under carriage. They tried to poke it down without effect so I offered my walking stick. Eventually it came down again and it was held with the spade across the body and the stick behind its head. The white man picked it up behind the head and held its tail in his other hand. The coloured man found a sack and discovered it had a hole in it! I left them poring over this problem. The Snake Park at Cape Town paid 2s 6d each for poisonous snakes, from which the venom is extracted for anti-snake bite serum, so the two were hoping to sell their victim.

COLLECTING EXPERIENCE WITH THE ARMY.

By F. D. BUCK.

Read 24th July 1946.

On being called up for military service I decided I would do what collecting I could while I was serving and accordingly packed some tubes, killing fluid and a collecting bottle in my kit.

For the first eighteen months I found myself stationed in Kent, where I did all my collecting while out on telephone line maintenance—much to the disgust and amusement of the other members of the line parties. However, they soon became accustomed to seeing me wander off after insects and later began to bring me odd specimens.

In 1942 the Division was shipped off to Egypt and of course our mail came under censorship. Forseeing the difficulty of sending specimens home under these circumstances, I approached my Officer about it. He flatly refused me permission to post my material home, saying that they could be identified and would give away my whereabouts—a neat point that! That was overcome by an interview with the Intelligence Officer when I convinced him that insects could not possibly be identified until the locality in which they were taken was known and, to my surprise, I was allowed to send my captures home.

The only way I could think of packing them was in small screws of tissue paper from cigarette packets (fortunately our cigarettes were packed that way) and packing them in tobacco tins.

My first Egyptian specimens were obtained at a spot known as Barrani's Tomb, where the fauna, though limited, was large enough to excite the interest of most of the chaps. That and the complete absence of any other form of entertainment induced them to keep vivaria made from petrol tins in which they put scorpions, beetles, lizards, ants and some of the most horrible looking arthropods I have ever seen.

Most of the men were firmly convinced that the sting of the scorpion was fatal, and nothing I could say would make them believe otherwise.

An amusing incident occurred when one lad did manage to get stung by one of these brutes—quite an easy thing to do as scorpions like nothing better than to crawl into blankets and sleep with one! This particular person was really scared and the Medical Orderly was convinced that within thirty minutes he would have a corpse on his hands. He phoned the R.A.P. saying he had an emergency case, wrapped his "casualty" in blankets and drove him into the Aid Post in a truck. Our M.O. was disgusted, and so was the "casualty" on being sent back to duty after receiving a dab of iodine on the assaulted part of his anatomy.

As far as I could discover, the whole of the fauna of the Alamein area consisted of Tenebrionid coleoptera with a few species of Carabidae, two or three species of ants and an assortment of queer arthropods.

In one position in that area our slit trenches acted as excellent traps and I was in great demand, being asked to remove large insects from various trenches. Some of the lads definitely would not occupy their trenches while these insects were in them.

Farther west I came across the Chameleon, which, of course, fed on flies, one of our greatest sources of annoyance. Consequently the Chameleon was very popular as a pet and was kept in the bivvy, which it would usually manage to keep clear of flies. It was about this time that I first met the Praying Mantis, a rather pretty pale green and white insect. A stick insect also occurred plentifully in this area. I took several specimens of both the Mantis and the stick insects but neither survived the long journey home.

At Tobruk I successfully worked under the ammo cases of a German munition dump for a number of Tenebrionids and an odd Carab or two, the latter being a large beast some inch and a half long, black, with four white spots on the elytra, two humeral and two apical (*Anthia* sp.).

A few Rhynchophora were obtained by digging deeply at the roots of a small dry bush that occurred occasionally in the Desert.

The most interesting country in Libya appeared to be the Green Mountains of Cyrenaica surrounding Barce, but unfortunately at that time we were moving rather fast and I had no time to collect there. I did, however, obtain a couple of *Meloë*, and about four or five more at Benghazi. These also suffered during the trip home.

It was at Benghazi that our junior signal officer, a very young lieutenant who was censoring my mail, asked me if I would mind showing him how I packed my specimens. I removed the lid of the tin and a large Carab that I had failed to kill walked out. I was certainly surprised, but the Lieutenant was so startled that he collapsed the bivvy on both of us!

Tripoli Oasis produced a greater variety of beetles than I had met as yet, including a pair of Carabs similar to *Calosoma*, roughly the size of *sycophanta* L. but of a pitchy colour with two rows of very small punctures having a bronze appearance.

Two or three species of Anthicids turned up here, one of which had the thorax produced over the head in a small horn in the manner of *Notoxus*.

An orange grove provided some Chrysomelas and a Staphylinid very similar to *Creophilus maxillosus* L. I also took some Lamellicorns with an appearance like *Amphimallus solstitialis* L., a few Rhynchophora, and a rather pretty quadrimaculate Ptinid.

The locust occurred quite commonly with two other species of grasshopper.

In this spot one of the chaps asked me to come and see some chromium-plated ants! I began to wonder if the sun had got him as he appeared quite serious, but I decided to risk having my leg pulled and investigate. There, sure enough, was a colony of ants that appeared to be chromium-plated. On examination they proved to be testaceous and were covered with dense silvery pubescence which in the strong sunlight gave a chromium effect.

Tunisia, being more fertile country than that through which we had just come, provided an excellent variety of beetles including Lagriids, Carabids, Cantharids, Anthicids and Lamellicorns among others. I took a series of rather dull-looking Buprestids some inch in length on some low bushes and just one specimen of a beautiful green one heavily punctured throughout.

An excellent example of camouflage I saw here was a spider found sitting in the flower-head of a large yellow marguerite looking so much like a turned down petal that a close examination was necessary before it could be detected. Quite obviously it sat there to catch such flies and small insects as settled on the flowers.

The vertebrates I noticed most in N. Africa were the Chameleons I have already mentioned; Jerboas, which were actually rats in spite of their close resemblance to miniature kangaroos and which could travel at an amazing rate hopping on their hind legs in the same manner as kangaroos; small snakes were often met, and lizards quite numerous, including an almost legless variety, the legs of which were so small that the creature had to be turned on its back before they could be seen.

Perhaps the most surprising animal was one small deer about 2 ft. 6 in. high to the shoulder, dashing about in one of the most vicious battles it was ever my misfortune to be mixed up in.

At Enfidaville our Battalion H.Q. was in a very narrow wadi, and two of us decided to enlarge a small cave for shelter. The walls of this cave were quite solid, composed of hard earth and rocks. After digging some 4 ft. or so out we came across frogs, and after another foot we were suffering from a plague of frogs; there were thousands of them and I think the description given to the rats of the Pied Piper might equally well have been given to our frogs. They stayed with us for days afterwards.

As far as Italy is concerned I was not there more than a few months during the latter end of 1943, and most of my captures appeared to be quite ordinary stuff. The area from which my material came was from Salerno Bay to the Garigliano River. Near the coast by Salerno I took three very nice *Crioceris*, about the size and colour of *C. lili*, but the elytra were rather heavily marked with black spots.

Just by Grazianise I was brought a large tin almost full of large Geotrupids, most of which were armed with large rhinoceros-like horns on the head; there were also a few *Onthophagus* and only one Staphy-

linid. The tin was given to me exactly as found, though I have not the faintest idea how that lot got in there. On the Naples Plain I obtained a few large bugs which my driver insisted were wearing football jerseys because they were striped longitudinally with red and black. The last captures I made before I left Italy were two *Cetonia*s (one metallic green and the other black) at Vico Equense on the other side of the bay to Naples.

In France the only areas I had any chance of collecting in were the Normandy beach-head in June and August 1944, and the Pas de Calais area for two days in September.

My first captures were near Bayeaux where I took *Timarcha tenebricosa* F., *Carabus auratus* L. with another *Carabus* sp., a pair of *Sinodendron cylindricum* L. (on a wall), and on flower-heads three Longicorns: *Strangalia armata* Pod., *Clytus arietis* L., and a *Leptura* species which was quite common. *Trichius fasciatus* L. also appeared to be fairly common on blossom though I only obtained a few specimens.

Near Caen my slit trench proved an excellent beetle trap and in it I took a number of *Pterostichus*, *Amara*, and other small Carabs, quite a few small Staphs. and two or three examples of a *Byrrhus* species. Others included a *Geotrupes*, *Carabus auratus* L. again, *Mycetophagus 4-pustulatus* L., and *M. piceus* F. *Melolontha vulgaris* F. occurred so plentifully that they became a real pest, swarming around the transport even more than they did around the trees.

While in Normandy I took the opportunity of obtaining a long series of the Colorado Potato Beetle. The damage they were doing was terrific, I doubt if much had been done in the way of counter measures since the fall of France.

My bag for the couple of days I was in the Pas de Calais area consisted mainly of Apions and Coccinellidae, though I took a couple of huge *Carabus* [*Procrustis*] that would make two of *C. violaceus*. It was a dull black insect with heavily rugose elytra. One I found dead in a slit trench and the other I took on the side of the road.

I have practically nothing to represent Belgium as we were continually on the move in this country, often stopping at night about 8 or 9 p.m. and moving off again at 5 a.m. Neither was Holland much more productive as we spent a very bitter winter here. Even an entomologist can feel that kind of cold! However, before the cold really set in I spent a couple of afternoons near Veghel investigating the tarred insect traps tied round fruit trees. The insects had crawled underneath the band and it proved quite a profitable occupation. The most numerous beetle was a small blue Chrysomelid; the rest of the bag consisted of a few *Tachinus* and *Tachyporus*, three species of *Dromius* (which I think are *4-maculatus* L., *4-notatus* Pz., and *meridionalis* Dj.), one or two *Rhinosimus*, and one solitary *Chrysomela polita* L.

At Weert in the spring of 1945 I took a number of *Cercyon* flying around at dusk near some stables. They were rather an attractive species—black head and thorax with yellow elytra, in the centre of which covering the suture was a large black diamond. These appeared for about two evenings and then disappeared completely.

We crossed the Rhine into Germany near Wessel in Westphalia and as things were once more moving fast I again found I had little opportunity for collecting. The most outstanding insects were a few *Carabus* species, probably *C. granulatus* L., and a very pretty Elaterid, some 10 or 12 mm. long, taken in a pine and birch wood; the head and thorax were shiny black and the elytra bright red.

The province of Hanover during April provided more interesting material. Under some empty fish barrels I took a long series of a *Thanatophilus* species, some *Necrophorus humator* Gz., and one or two *Oeceoptoma thoracica* L. Among these were some *Hylobius abietis* L., which no doubt had come from a near-by pine wood.

Near Hamburg I was stripping bark from a log that was infested with *Pyrochroa* larvae among which I found four pupa. These I decided to keep, placing them in a tin with some frass from beneath the bark. Eventually they emerged and proved to be *Pyrochroa serraticornis* Scop. None of them was a good specimen, however, as all had damaged their elytra when emerging.

Moving out of Hanover I found myself in Schleswig-Holstein near the Danish border, where I spent a short time during May. Most of my activities here were confined to a small pond which had a large bank of nettles on one side and a fair amount of mud on the other. From the nettles I took a large number of a small iridescent green *Chrysomela* and some *Agonum dorsalis* Pont., while from the mud a long series of an *Omalium* and a few small Staphylinids. None of the other usual mud species was in evidence. On the window of the billet I took a solitary *Molorchus*.

We next moved to Brunswick, where we were placed in billets that had previously been used by displaced persons, and the following morning I was sent for by the M.O. I had to accompany him on a billet inspection to identify insects that the men had complained were bugs. They were and we moved just outside the city where the insect fauna, if not quite so prolific, was more comfortable! The male *Lampyrus* was very plentiful here on the wing during the early part of the night. I caught quite a number of these by allowing them to settle and then bottling the "light." Though they were about for over a week I saw no females at all. Every one I took from the ground at the roots of the grass turned out to be a male as well. From this spot I also took a few *Leptura*, two species of *Cionus*, one or two large *Chrysomela*, and five *Crioceris lilii* Scop.

My last entomological note is the large number of Aleocharines and Cholevas running around the ruins in the Spandau suburb of Berlin.

N. AFRICAN MATERIAL.

Tobruk, Libya:—*Opatroides punctulatus* Brullé, *Akis obstituber* Mars., *Pachyscelis villosa* Drap., *Pimelia obsoleta* Sol., *Adesmia monilis* Klug, *Scaurus tristis* Oliv., *Erodium gibbus* Fab., *Blaps punctostriata* Sol.

Benghasi, Libya:—*Opatroides punctulatus* Brullé, *Scaurus tristis* Oliv., *Oteroscelis carmelitana* Reitt., *Oxycara hegetericum* Reiche, *Tentyria punctostriata* Sol., *Trichomeloe chrysocomus* Müll.

Cyrenaica, Libya:—*Anthicus quisquilius* Th.

Zouara District, Libya:—*Akis goryi* Sol., *Erodium gibbus* Fab., *Eurycaulus marmotti* Fairm., *Blaps gages* L., *Ocneria hispida* Forsk.

Tripoli Oasis, Libya:—*Stenopsis fulvipes* Reiche, *Tentyria mauritanica* Baudi, *Akis italica* Sol.

Marath District, Tunisia:—*Erodium gibbus* Fab., *Tentyria mauritanica* Baudi, *Pimelia platynota* Fairm., *P. inflata* Hbst., *P. scabri-collis* Sén.

SOME NOTES ON OBSERVATIONS OF THE RHOPALOCERA OF SOUTHERN ITALY (1944-5).

By RAYMOND F. HAYNES.

Read 28th August 1946

It is clearly well outside the scope of a paper of this type to attempt to provide a comprehensive and exhaustive guide to all the butterflies which are to be found in Southern Italy. These notes were compiled from my own scanty observations which I was able to carry out from time to time in my somewhat limited leisure periods whilst on Active Service duties during 1944-5 in Southern Italy.

At first sight it might appear a very far cry from soldiering to lepidoptera collecting, but in the hectic and often dangerous times through which all of us have lived during recent years, nothing seems better for one's peace of mind and escape from the grimness of War than to turn to a hobby of this type. I did not conceive, during my early days on the Italian Peninsula, the idea of writing a paper on Italian Lepidoptera and unfortunately I did not store up any written notes; so I write this paper from memory, aided slightly by a few brief entries in my diary.

Prior to being posted to Italy with the Army, I had never before visited the country and therefore had very little idea what butterflies would be likely to come under my observation. I landed at Naples on 27th March 1944, just at the time that Vesuvius Volcano was in eruption. After a brief stay at a Staging Camp at a town called Afragola (about 10 miles from Naples) I went to a camp well out in the wilds at a place called Persano. This village is about 20 miles South-East of the port of Salerno and approximately 100 miles from the Gulf of Taranto, in the province of Campania. The month was now April and in Southern Italy the weather at this time of the year is much warmer than in Britain, so it was not long before I began to see insects in some abundance.

At first I saw only the common Pieridae—*Pieris brassicae* L., *P. rapae* L., and *P. napi* L., as well as some *Pararge megera* L., but very soon *Papilio machaon* L. began to put in an appearance; thereafter I was destined to see that handsome insect on and off for many months to come. After a fortnight, spent on the Adriatic Coast in action, I returned to Persano and remained there until the latter end of July, so I had virtually all the spring and early summer to make observations and if possible attempt some serious collecting. On my return to Persano the quantity and variety of the butterflies I saw finally induced me to start collecting in earnest, even under the extremely difficult conditions. I had brought absolutely no entomological equipment abroad in my kit and I had therefore to fall back on my own

resources. Eventually I rigged up a net of sorts and found that Army petrol was a good substitute for cyanide.

Although my remarks primarily concern the insect life in the immediate vicinity of Persano, they are relevant to the whole of the Southern part of the Italian Peninsula excluding the elevated, mountainous portions. The terrain in the neighbourhood of Persano consists of gently undulating countryside, interspersed with numerous vineyards, cornfields and fruit orchards. The mountainous part of the Peninsula lies further to the North. The camp at which I was stationed was in the area of a large, scattered farmstead, stretching between the main road running from Eboli to Bari on the one hand and on the other the railway line from Battipaglia to Potenza. Behind the railway the terrain is wooded to some extent and the ground slopes steeply down to the Sele River. There is thus varied vegetation likely to support many kinds of rhopalocera. Poplar and willow appear to be the commonest trees, supplemented by a sprinkling of oaks and elms but birch is entirely absent.

Beginning with the Papilionidae, I have already remarked on the occurrence of *Papilio machaon* L. I found this species to be quite the commonest insect in this part of the country. Almost any situation pleases it; edges of woods, roadsides and vineyards alike are its favourite haunts; a day seldom passed without a dozen or more being observed and some days, indeed, this was the *only* species of butterfly to be seen. When in flight this beautiful butterfly is exceedingly difficult to capture and seldom settles. After several futile attempts to net good specimens I resolved to breed a series. At first I was unaware on what plant the female *machaon* deposits her ova, but one day I found an almost fully-fed larva on fennel. After much diligent searching I found several ova, which I succeeded in rearing. The original larva duly turned into a pupa, but broke loose from its silken mooring and on emergence was a complete cripple. However, this was the only bad luck I had in rearing this species; thereafter I continued to find ova and larva of *Papilio machaon* all through the summer on almost any clump of fennel I turned to; even dusty plants growing along roadsides were selected. Frequently I saw females ova-depositing. At the end of the season I had reared about 20 good specimens.

In company with *P. machaon*, its near relative *Papilio podalirius* L. was to be seen in almost as large numbers in many places, but I considered the species to be less widely distributed than *P. machaon*. The situations favoured by *Papilio podalirius* L. seemed to be fruit orchards and outskirts of vineyards. After much searching for ova and larva on fennel I was unrewarded, as at that time I was unaware that the food plant of this insect is the foliage of fruit trees. However, the more leisurely habits of the imagines of this species compared with *P. machaon* allowed me to take a series with the net good enough for cabinet purposes.

My favourite collecting ground was a small valley. The sides of this valley, through which wandered a small stream heavily overgrown with various kinds of bushes, were clothed thickly with hedge bedstraw (*Galium mollugo* L.), sheep's-bit scabious, thistles and many other varieties of wild flowers familiar to British naturalists. On 21st May 1944 I saw three *Aporia crataegi* L. in this valley and succeeded in netting two of these; from that time onwards I saw no more of this insect and came to the conclusion that it is somewhat scarce in Italy. The time limits during which it is on the wing are probably narrow. I was pleased to find specimens of *Leptidea sinapis* L. in this locality but the species was rather local and the times of appearance very uncertain. In June at Persano I caught a few early specimens of *Colias croceus* Fourc. but towards the end of the summer when I was further north I found the species very common. Before leaving the Pieridae group I have to record that *Pontia daplidice* L. appeared to be very abundant. It began to emerge in late May and I continually saw the insect all through the summer, almost throughout the Southern part of the Peninsula. The only other species of this family that I saw in the Persano district was *Gonepteryx cleopatra* L., but very seldom, and I did not have the good fortune to net a single specimen, except a female, later in the year in another locality. Curiously enough, *Euchloe cardamines* L. (a common British species) seemed to be entirely absent, although its food-plant *Cardamines pratensis* L. grows quite profusely in Italy.

Turning now to the Nymphalidae, I found at Persano *Melitaea athalia* Rott. and later *Melitaea didyma* Esp. were fairly common. Capture was not difficult as *M. athalia* was fond of settling on low growing thistles. I first saw the insect in late May (rather earlier than in Britain) but it continued to be seen throughout the summer in widely separated localities; by July all examples that I saw had become very worn. Towards the end of June I began to take examples of *Melitaea didyma* (Twin-spot Fritillary) and until about the middle of July I continued to find freshly-emerged specimens. The haunts of this rather attractive-looking Fritillary are edges of woodlands, hillsides and fields, wild or cultivated. It is very fond of perching on thistles but otherwise is not an easy insect to catch on the wing and is difficult to follow.

The Vanessids were represented by *Polygonia c-album* L. but nowhere did I find it at all abundant. In the neighbourhood of Persano I constantly saw *Vanessa cardui* L., but *Vanessa atalanta* L. was only an occasional visitor. There is a certain amount of migration to Italy of the two species and it may not be out of place to mention here that although the larvae of *V. cardui* L. normally feed on thistles and appear to be harmless to cultivated plants, in 1826 Gené and Villa record its presence in destructive numbers in the province of Milan, with disastrous results to the crops of lupins and flax. A similar visitation in Northern Italy was recorded in 1879 by Count Ninni. *V. cardui* is efficiently parasitized by the Chalcid fly *Pteromalus puparum* L. (*Lepidoptera of the Maltese Islands*, P. Borg, F.C.S., F.Z.S.).

Among the Satyridae I noted the following species: *Melanargia galathea* L. appeared to be extraordinarily abundant around Persano and many other places. The time of appearance is earlier in Italy than in Britain as by the middle of June it was practically over and I did not observe a second brood. Another closely allied species, *M. japygia* Cyr. (Sicilian Marbled White), was also very common. Continuing with the Satyridae, I saw *Maniola jurtina* L. very common everywhere; *Coenonympha pamphilus* L. was abundant in all districts and I continued to see the insect all the way up to the North of Italy. Also *Aphantopus hyperantus* L. could be found in wooded areas, and *Maniola tithonus* L. in all country places. I must mention here *Pararge megera* L., which I saw in large numbers in almost every locality I visited from Naples to Florence and beyond. Another common insect I noticed in woodland areas was *Pararge aegeria* L.

About the middle of May 1944 I found *Polyommatus icarus* Rott. on the wing. I continued to see the species throughout the summer and autumn in every locality imaginable. They seemed to differ but little from our British examples. Other species among the Lycaenidae I noticed were *Aricia agestis* Schiff., *Callophrys rubi* L. and later *Lysandra coridon* Poda, *Lysandra bellurgus* Rott. and *Lycaena phlaeas* L. The Hesperiidæ family were represented by *Erynnis tages* L., *Pyrgus malvae* L. and the Continental Large Grizzled Skipper *Pyrgus alveus* Hb.

At the latter end of July I was moved from Persano and proceeded further North to a small town called Palestrina, about 24 miles South-East of Rome. The terrain here consists of low hills, well-wooded valleys and vineyards. In this locality *Papilio machaon* I found to be almost as common as it had been further South. During August ova, larvae, pupae and imagines were to be found at the same time. It was in this locality that I first discovered the following species, which are so seldom seen in Britain:—*Argynnis lathonia* L., *Lycaena hippothoe* L., *Lampides boeticus* L., and *Everes argiades* Pall. My enthusiasm to take *A. lathonia* on the wing led me into situations that were not entirely without their element of danger, as this district had but recently been evacuated by the Germans. The likely presence of mines and booby-traps in the fields proved a slight deterrent to collecting. Fortunately, I met with no mishaps and in some lucerne fields near Palestrina I caught some fine specimens of *A. lathonia*, *L. boeticus*, *E. argiades*, *C. croceus* and var. *helice* Hb. A few days later, whilst on a visit to Rome, I was surprised to see a newly-emerged *A. lathonia* flying about in the streets of the city. The few examples that I took of *L. hippothoe* were unfortunately rather worn, and I did not secure any good specimens. In the Palestrina district *M. didyma* was to be seen in very fine condition and I think that I am right in assuming that the species is double-brooded.

In the same place I saw, but unfortunately did not catch, specimens of the Mediterranean White Admiral, *Neptis lucilla* W.V. However, a

few weeks later I succeeded in securing a series of the species in another locality. Another Continental species that was in evidence at Palestrina was *Hipparchia circe* F., in appearance similar to *Eumenis semele* L., but much larger. All my efforts to capture this creature were unavailing; altogether it is an exceedingly strong flyer. *P. daplidice* was as common as before and I was able to take a good series.

After a short while at Palestrina my regiment moved up into action. We first took up position on the flat marshy ground south of Pisa. The gun position was situated in a small pine wood, surrounded by a sandy heath and lucerne fields. Blackberry bushes were very profuse and daily I saw numerous specimens of *L. boeticus*, *E. argiades* and a similar species called *Lampides telicanus* Hb. flying around the bramble flowers. I was able to continue collecting and found the following kinds of butterflies very abundant: *C. croceus*, *C. hyale*, *P. daplidice*, *L. bellargus*, *L. phlaeus*, and the Large Grizzled Skipper *P. alveus*.

Later in the season I was in another gun position to the south of a town called Prato in the vicinity of Florence. The weather was extremely sultry for several weeks and I took good series of *C. croceus*, var. *helice* and *C. hyale*, all of which were extremely common. *P. machaon* (rather scarce in the Pisa area) was once more in great evidence, as well as *P. podalirius*. In a small but densely overgrown wood in the immediate vicinity I discovered *L. sinapis* again, the summer brood this time. Also I caught a female *G. cleopatra* and obtained examples of *N. lucilla*. I found another species of fritillary here called *Argynnis dia* L. (Weaver's Fritillary), which is a reputed British species. This was the only locality that I saw *A. dia*. Although well away from any chalk hills I observed several *L. coridon*; the strain appeared almost identical with the British.

From this period (September 1944) onwards, I was moved gradually further North to a point about 18 miles South of Bologna and by November I saw nothing further of interest in entomology. I would like to remark here, however, that during August and September I saw occasional specimens of *Nymphalis io* L. and *P. c-album* but on no occasion did I come across *Aglais urticae* L., which I thought rather surprising. Throughout the winter and early Spring of 1945, I still continued to see a few *P. megera* on sunny days.

So much for the Rhopalocera, but I feel this paper would be incomplete without a brief mention of the few species of Heterocera that came my way. On my arrival at Persano in the Spring of 1944 I saw large numbers of what I at first thought were male *Saturnia pavonia* L. (*carpini* Schiff.) flying about in the sunshine. A few weeks later in early May I found a colony of young larvae of this species on hawthorn. These larvae became fully grown in July and about fifteen produced cocoons soon after. I was permitted to send these home to England by post and on my arrival home at the beginning of April this year (1945) eight specimens emerged, 3 males and 5 females, which are now in my collection. I have now been able to identify this species, which is

Saturnia spini W.V.; the moths which emerged from my cocoons strongly resemble our British Emperor moth but are somewhat larger and more handsomely marked.

Also at Persano in May 1944 my attention was directed to two fine imagines of the silk-bearing moth *Saturnia pyri* W.V.; these are now in my collection. A few days before leaving the Persano area three fully-grown larvae of *S. pyri* were brought to me and these pupated almost immediately, spinning very striking cocoons. Two moths emerged (both females) in May of this year (1945) but the third never matured and when I opened the cocoon some time later I found that the moth had developed but died when on the point of emerging. The larvae of *S. pyri* cause considerable damage to fruit trees on the Continent and at Persano I saw several trees very much stripped as a result of attacks by these voracious caterpillars but was too late to find any actual larvae.

All over the Peninsula *Macroglossum stellatarum* L. was in evidence and after searching in early June 1944 on Hedge Bedstraw, along the roadsides near Eboli, I found ova of the moth. These I bred, the moths emerging about six weeks later, but I regret to say that the majority escaped from the breeding cage. At Persano, during sunny weather, I noticed *Coscinia striata* L. to be fairly common. Later, whilst in the Pisa district in August 1944, *C. striata* seemed to be extremely abundant in the lucerne fields, always flying in the hot sunshine. Also in the Arctiidae family I noticed *Arctia villica* L. and *Phragmatobia fuliginosa* L. Of the Lasiocampidae these species were well distributed:—*Lasiocampa quercus* L., *L. trifolii* Schiff. and *Macrothylacia rubi* L. Space prevents me from enumerating the various Noctuidae and Geometridae that can be found in Southern Italy, but as a matter of interest I should like to mention two species of the Zygaenidae that I recorded. At Eboli and in the surrounding district during the middle of June 1944 *Zygaena ephialtes* L. was very abundant, flying in swarms just before sun-down. *Z. ephialtes* is closely related to our native *Z. filipendulae*. The other member of this family that I captured was *Procris geryon* Hb.

My object in writing this paper, which I must confess is of little scientific value, was solely to interest members who are not familiar with Italy. If, by my efforts, I have succeeded in arousing your imagination, then my aim will have been achieved, and I shall feel that the time I spent in Italy will have been put to good use. I may add that I sincerely hope to revisit the Persano district at a later date, when normal peace-time travel is restored. Doubtless I shall be able to record many other species.

Note.—The scientific names used throughout this thesis are, as far as possible, taken from I. R. P. Heslop's *Check List of the British Lepidoptera*, published by Watkins & Doncaster, 1945.

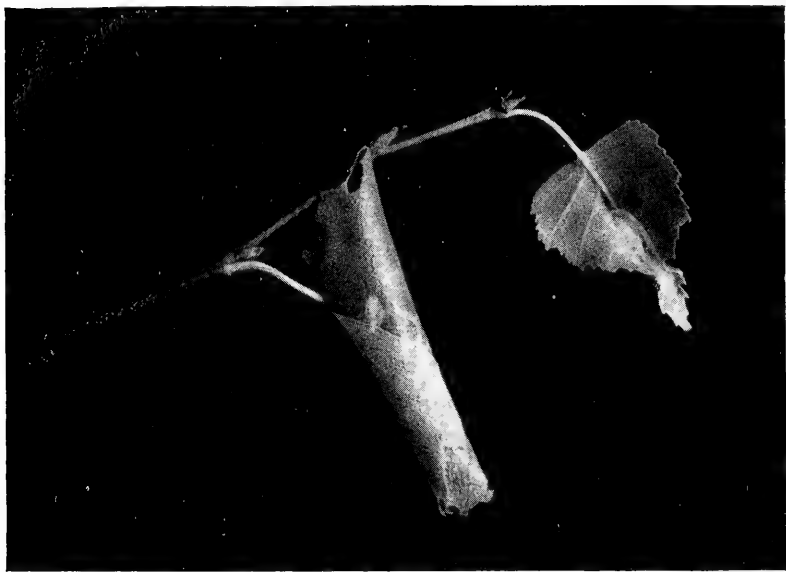
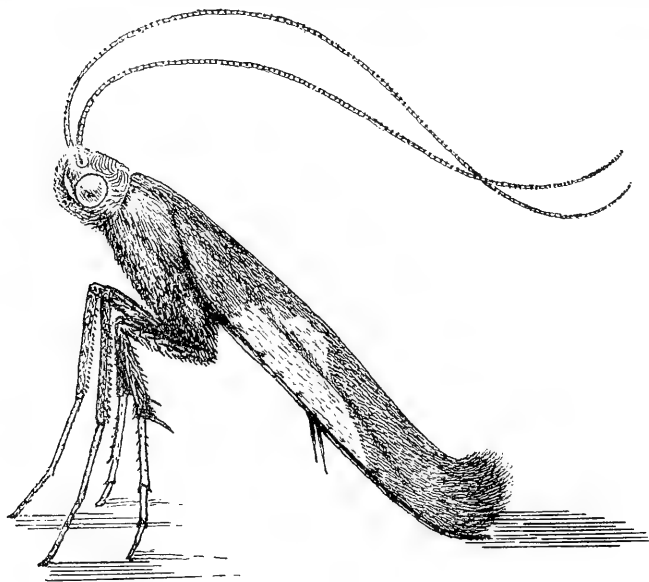


Photo. S. C. S. Brown.
LARVAL "CONE" AND COCOON OF *C. BETULICOLA* HERING.



F. C. Fraser del.
RESTING POSTURE OF *CALOPTILIA* SP.

CALOPTILIA HÜBN, A GENUS OF TINEINA.

By S. C. S. BROWN.

Read 25th September 1946.

This genus, so long known as *Gracillaria* Haworth 1828, or *Gracilaria* Zeller 1847, should be *Caloptilia* Hübn. 1825.

Meyrick, *Handbook British Lepidoptera*, 1895, puts *Gracilaria* in the Family Tineidae after *Lithocolletis*, *Ornix* and *Coriscium*. In his *Revised Handbook*, 1928, he places *Gracilaria* in the Family Gracillariidae, suppresses the genus *Coriscium*, places two species (*cuculipennella* Hübn. and *sulphurella* Haw.) previously included in the latter in *Gracilaria*, and omits *omissella* Staint., *ononidis* Zell. and *imperialella* Mann. Meyrick states that in the genus *Gracilaria* there are nearly 200 species, universally spread, even in remote Pacific islands.

In Rebel's *Catalogue of the Palaearctic Lepidoptera* there are about 40 species listed. Meyrick in his *Revised Handbook* includes 14 species found in the British Isles.

The imagos of this genus average about 11 mm. The head is clothed with appressed scales. The wings are elongate with long cilia, the antennae being as long as the wings. The labial palpi, a characteristic feature, are long, curved, ascending, and in two species are tufted beneath. The legs are very long, the middle tibiae being ornamented with dense tufts of scales, which are prominently displayed when the insect is at rest. The colouration of the forewings is often beautiful, chiefly consisting of rich browns and yellows. A characteristic mark, not always present, however, is a triangular costal blotch. Considerable variation is present, especially amongst what may be termed the "*elongella* group," namely *falconipennella*, *elongella*, *populetorum*, and *betulicola*.

When in repose the imagines have a most striking attitude, peculiar to the family Gracillariidae. Whilst the members of the genus *Argyresthia* rest with the hinder part obliquely raised, as if trying to stand on their heads, the members of this group try to do the opposite; the head with the anterior part of the body is elevated, the anterior and middle legs turned out and the posterior legs tucked in against the sides of the abdomen underneath the wings, which are tightly drawn over the body.

The ova, which are very delicate in texture, are laid singly, except in the case of *syringella*, generally on the underside of a leaf.

The larvae, which are very similar to one another, are invariably leaf-miners at first. The majority make a long, twisting mine, which owing to the small amount of frass visible, appears much like the mine made by a Dipterous larva. The mine usually terminates in a blotch, often similar to that made by the larvae of *Lithocolletis*. On leaving the blotch the larvae feed externally in rolled or twisted leaves, the only exception being *tringipennella*, whose larva remains in the blotch

throughout its existence, and pupates there. These rolled leaves, or "cones" as they are usually called, are very characteristic of the larval habits of this genus and are often very neatly constructed. The larva feeds on the inner surface of the "cone," the frass being deposited in a little heap at one end. When the food has become exhausted the larva leaves that "cone" and constructs another.

The pupa is enclosed in a firm tough cocoon, sometimes spun up within a "cone" but usually on the edge of a leaf, rarely on the ground.

The perfect insects fly naturally in the early evening, but owing to their small size and retiring habits, are not usually observed on the wing.

The hibernating species may sometimes be taken at ivy-blossom in the autumn or beaten out of yews or thatch.

Two species, *syringella* and *azaleella*, are well-known horticultural pests, the former being in fact one of our most abundant Lepidoptera. Other species are rare, or perhaps overlooked, for little attention has been paid to the study of the *Tineina* in recent years in this country, and much remains to be done in this rich and fascinating field.

ACKNOWLEDGMENTS.

I gratefully acknowledge the assistance given by Lt.-Col. F. C. Fraser, I.M.S. Retd., F.R.E.S., for all the coloured figures, the black-and-white drawing, and help in many ways.

Mr T. Bainbrigge Fletcher, R.N., F.L.S., F.R.E.S., in connection with the nomenclature and literature, and for the translation of the German part of Berander's Monograph.

Mr E. A. Robins, F.R.P.S., F.L.S., for the photograph of the early stages of *betulicola*.

Mr A. E. Wright, F.R.E.S., for the loan of specimens of *populetorum* for figuring.

Mr L. T. Ford, for the loan of a specimen of *pyrenaeella* for figuring.

Mr Parkinson Curtis, F.R.E.S., and Mr R. Broome, F.R.E.S., for assistance with the microscopical preparations.

KEY TO BRITISH SPECIES

- | | | |
|--|----|------------------------------|
| 1. Second joint of palpi tufted beneath | 2 | |
| Second joint of palpi not tufted | 3. | |
| 2. Forewings pale yellowish | | 5. <i>sulphurella</i> . |
| Forewings not yellowish | | 4. <i>cuculipennella</i> |
| 3. Forewings with several pale marginal spots or fasciae | 4. | |
| Forewings with not more than two pale spots | 6. | |
| 4. Forewings with entire fasciae | | 3. <i>syringella</i> . |
| Forewings without entire fasciae | 5. | |
| 5. Forewings with three costal spots | | 2. <i>phasianipennella</i> . |
| Forewings with one subcostal and one costal spot | | 1. <i>auroguttella</i> . |
| 6. Forewings with white costal streak | | 6. <i>tringipennella</i> . |
| Forewings without white costal streak | 7. | |

7. Forewings with distinct black median spot	7. <i>populetorum</i> .
Forewings without such spot	8.
8. Costal blotch or traces of it yellowish	9.
Costal blotch or traces of it whitish	12.
9. Costal blotch margined anteriorly by a dark fascia ...	16. <i>hemidactylella</i> .
Costal blotch without dark fascia	10.
10. Costal blotch well defined	11.
Costal blotch almost obsolete	14.
11. Costal blotch triangular	11. <i>alchimiella</i>
Costal blotch elongate or trapeziform	15.
12. Costal blotch triangular	13.
Costal blotch reduced to a streak or almost obsolete ...	14. <i>semifascia</i> .
13. Costal blotch well-defined posteriorly	15. <i>stigmatella</i> .
Costal blotch ill-defined posteriorly	10. <i>falconipennella</i>
14. Hind coxa, apex dark	8. <i>elongella</i> .
Hind coxa, apex white	9. <i>betulicola</i> .
15. Costal blotch elongate	12. <i>azaleella</i> .
Costal blotch trapeziform	13. <i>pyrenaeella</i> .

1. *auroguttella* Steph.

9-10 mm. Antennae with apex white. Forewings dark grey, rather shining, purplish tinged, with four yellow spots. One below costa at $\frac{1}{2}$, another on costa at $\frac{3}{4}$, and two on dorsum, near base and before tornus. Hindwings grey.

Larva pale yellowish-green, head pale yellow. Feeds within conically rolled leaves of *Hypericum perforatum* and *pulchrum*.

The larva commences to feed by mining the under surface of a leaf in the form of a blotch and this causes the leaf to pucker longitudinally. It then quits the blotch and forms a cone by turning a leaf downwards and backwards with the edges neatly fitting. The larva constructs two cones, working progressively upwards, before becoming full-fed. It then selects a leaf at the top of the plant, which it rolls up longitudinally into a tight tube and pupates within.

There are two broods, the imago flying in May and August and the larva feeding in July and October. Passes the winter in the pupal state.

This species seems to be generally distributed and common throughout England. Occurs in Ireland.

2. *phasianipennella* Hübn. (*quadruplella* Zell.).

10-11 mm. Forewings dark fuscous, somewhat shining; three costal spots at $\frac{1}{3}$, $\frac{2}{3}$, and near apex, and two, frequently connected, dorsal spots at $\frac{1}{4}$ and $\frac{1}{2}$ ochreous-whitish, dark margined, often very indistinct or obsolete. Hindwings grey.

Larva greenish-grey, head yellowish, with four black spots; second segment with yellowish plate and four black spots. (Stainton.)

Within conically rolled strips of leaves of *Polygonum hydropiper*, *P. persicaria*, *Rumex acetosella* and *obtusifolius*. The larva commences to feed by making an oval, flat blotch-mine beneath a leaf. It then goes to the tip of a leaf, or the edge, where it makes a small puckered mine, turning the edge over. On leaving the mine to feed on the exterior, the larva constructs an abode in a very peculiar manner; it cuts

a strip along the edge of a leaf, which is only fastened at one end, and then rolls up and fastens this strip into the form of a blunt cone, in which it feeds. On the food-supply becoming exhausted, the larva goes to another part of the leaf or a fresh leaf, and constructs another roll. When full-fed it pupates in a white silken cocoon within the last cone.

A single-brooded species, the imago being found from September to May and the larva in July and August.

Widely distributed in Britain as far north as Perth. Occurs in Ireland.

3. *syringella* Fabr.

10-13 mm. Forewings white or yellowish-white, with numerous ochreous-brown dots and blotches, variable in amount. An ochreous brown dorsal blotch near base, hardly reaching costa. An oblique median fascia, and another dorsally bifid fascia at $\frac{2}{3}$ ochreous-brown, margined black. The apical area beyond the second fascia is almost entirely brownish-ochreous, except for two white, black-edged wedge-shaped costal spots. Hindwings dark grey.

Larva greenish-white, head tinged brown. Within rolled leaves of *Ligustrum*, *Syringa* and Ash. Abroad also on *Deutschia*, *Diervilla*, *Euonymus* and *Forsythia*.

The gregarious larvae, which are remarkably glass-like when very young, commence to feed by making a short, broad mine on the under-surface of a leaf. They then pass through to the upper surface where they construct a large blotch-mine. This blotch rapidly turns brown and causes a considerable disfigurement of the leaf. The larvae then vacate the mine and roll up the tip of a leaf into a large, slovenly constructed cone. The greyish-white silken cocoon is constructed amongst rubbish on the surface of the ground.

There are two broods, the imago flying in May and July. The larva feeds in June and again in August and September. Passes the winter as a pupa. Widely distributed and very common throughout the British Isles.

4. *cuculipennella* Hübn.

11-12 mm. Second joint of palpi tufted beneath. Forewings whitish, with numerous ochreous-brown strigulae finely irrorated black. An oblique fascia near base hardly reaching costa, another before middle hardly reaching dorsum, a third beyond middle interrupted in disc, and a costal spot at $\frac{2}{3}$ ochreous-brown, finely irrorated black. Hindwings dark grey.

Larva pale yellowish-green, head and plate on 2 brown. Feeds within conically rolled leaves of privet and ash.

The larva commences to feed by making a long twisting mine terminating in a blotch on the upper surface of a leaf. On vacating the mine the larva rolls up the apex of a leaf into a cone and feeds within. On leaving the cone in order to construct another, the larva vacates it

by cutting a little emergence hole. The final cone is very neatly constructed, nearly the whole of a leaf being used, the edges closely sealed with silk.

Pupates in a fine white silken spindle-shaped cocoon slung hammock-like within the final cone. The pupa protrudes from the cone at the time of emergence through a previously prepared emergence hole which is covered by a "cap."

A single-brooded species; the larva feeds in July and August and the imago occurs from September to April.

Local, but fairly common in England. Is found in Ireland. Prefers woods.

5. *sulphurella* Haw.

12-14 mm. Second joint of palpi tufted beneath. Forewings pale whitish-yellow, with numerous scattered black dots, variable in number, sometimes confluent, forming dark blotches, sometimes a ferruginous black-spotted median longitudinal streak from base of costa to apex. Cilia fuscous, except at apex, which is pale whitish-yellow. Hindwings dark grey.

Larva greyish-white, head brownish. (Meyrick). Within conically rolled leaves of oak. Little appears to be known about the early stages.

A single-brooded species, the larva being found in June and July and the imago from September to May.

Widely distributed, but not generally common; over most of the British Isles.

6. *tringipennella* Zell.

10-13 mm. Forewings pale ochreous to ochreous-grey; a costal streak from base to near apex whitish or whitish-grey. Three longitudinal rows of black dots, one subcostal, one median, and one on the fold. The last row is often absent or reduced to two or three dots. Hindwings grey.

Larva whitish-green, head black. In blotches in the leaves of *Plantago lanceolata*. The larva commences to feed by making a long tortuous mine on the upper surface of a leaf; it then works towards the midrib, where it constructs a large longitudinal whitish-brown blotch. The loosened upper epidermis contracts and causes a contortion of the leaf into a tubular form. Pupates within the blotch in a white spindle-shaped cocoon.

There are two broods, the imago flying in May and August. The larva feeds in June and July, and again from October to May.

Widely distributed and common throughout the British Isles.

7. *populetorum* Zell.

11-14 mm. Forewings pale ochreous, purplish tinged, with some cloudy-grey markings. Margins dotted black; a distinct black spot just beyond the middle of costa, blackish dots on fold at $\frac{1}{3}$ and $\frac{2}{3}$. Hind-

wings dark grey. The dark-coloured specimens of this species have some resemblance to *falconipennella*, but *populetorum* may always be at once recognized by the distinct black spot beyond the middle of the costa.

Larva greenish-white, head pale brown. Within longitudinally rolled leaves of birch. Its name *populetorum* seems to be a misnomer, it has never been bred from anything but birch.

Of the early stages Wood writes: "It usually selects a young leaf for its mine, agreeing in this respect with its congeners. Sometimes the mine is on the upperside, and sometimes upon the underside. It is on a larger scale than in any of the other species, the gallery being long and rather wide, and the blotch large and open; it is also a more unshapely structure, and is extremely like a Dipterous mine, which also consists of a gallery and blotch, and is not uncommon in the birch leaves. The larva is careless of the fashion of its first chamber, at one time rolling up half a leaf or a whole one if small, at another simply folding over a piece of the edge, or turning it into a cone; but of the shape of its final chamber it is most particular, and proceeds by rolling up the leaf longitudinally, using a whole leaf for the purpose."

Usually constructs its cocoon in a rolled up leaf, sometimes just beneath the edge of a leaf.

A single-brooded species, the larva being found in July and August, and the imago from September to April. Usually considered to be a local species in England and uncommon, probably overlooked. Has recently been recorded as abundant in Inverness-shire. Rare in Ireland.

8. *elongella* Linn.

14-16 mm. A very variable species. Forewings frequently deep reddish-ochreous without markings; sometimes straw-coloured. Another form has a variable ground colour with the margins and fold dotted black and an indistinct pale yellowish triangular costal blotch before middle. Hindwings grey.

Larva whitish green, head pale brown. Feeds within longitudinally rolled leaves of alder. The larva commences to feed by making a long, twisting, narrow mine on the upper side of a leaf, ending in a blotch. On leaving the blotch the larva spins up a portion of the leaf into a rather large, longitudinally rolled cone. The larva constructs two of these cones before becoming full-fed.

Pupates in a glistening white silken cocoon spun up in a slight fold of a leaf.

A double-brooded species, the larva being found in May and again, and much more commonly, in July and August. The imago is on the wing in June and again from September to April.

Probably widely distributed and common throughout the British Isles wherever alders grow, but owing to the difficulty of distinguishing this species from the next, it will be some time before the true distribution is known.

9. *betulicola* Hering.

Named and described by Hering. (*Zts. Angew. Ent.*, XIII, 1927). 7-9 mm. Similar in appearance to *elongella* and similarly variable.

Hering, in his key to the genus (*Schmett. Mitteleuropas*, 1932) states that the fore and mid femur and tibia are bright red-brown in *elongella* but are black-grey in *betulicola*.

Benander does not agree that the two species can be separated by this character, but he considers that a distinction can be found in the colour of the hind coxa. "In *betulicola* its apex is always whitish, but in *elongella* dark. If, as sometimes happens, it is pale, then it is yellowish and not white."

Genitalia examination is the most reliable method for separating these two species.

Benander writes: "In both species the penis ends in two strongly chitinized tips. In *betulicola* one of these tips has a single row of 4-5 small spinules; in *elongella* there are numerous prone spinules scattered all around the tip. The female genitalia exhibit stronger differences. In *betulicola* the Ductus bursa (e) is short and thick and runs straight to the Bursa copulatrix: in *elongella* it is decidedly narrower and its course has a kink in it near the Bursa copulatrix."

The larva commences to feed by making a relatively broad mine, ending in a narrow longitudinal blotch, on the upper surface of a leaf of birch. On leaving the blotch the larva rolls up a leaf transversely into a cone. It constructs two of these cones before becoming full-fed.

Wood suggested as long ago as 1890 that the Alder-feeding *elongella* might be biologically distinct from the birch-feeding *elongella*. His views were supported at the time by Stainton.

Pupates in a glistening white silken cocoon spun up in a slight fold in a leaf.

A double-brooded species, the larva being found in May and again in July and August. The imago is on the wing in June and again from September to April.

Abroad, *betulicola* has been found in North Germany, North Russia and in Sweden. It will probably be found anywhere in the British Isles where birches grow.

An examination of the genitalia of a considerable number of captured and bred specimens from various parts of the British Isles has shown that *elongella* is restricted to alder whilst *betulicola* is restricted to birch.

Betulicola is abundant in Inverness-shire and occurs in the New Forest, West Hants and East Dorset. As far as is known there is no British record nor any mention of it in any British work or paper, hence this will be the first time that this species has been brought forward as an inhabitant of these Isles.

10. *falconipennella* Hübn.

12-14 mm. Forewings dark reddish-brown, obscurely irrorated grey, margins and fold dotted black. An indistinct greyish triangular costal blotch before middle. Hindwings dark grey.

There appears to be no published description of the larva. Feeds within folded leaves of alder.

In regard to the early stages, Wood (1890, *Ent. Mon. Mag.*, xxvi, 136-137) writes: "Little, I believe, was previously known about this larva. It lives upon alder, and is of extremely rare occurrence in my own district, but is to be found in small but constant numbers in a dingle on the western side of the county. It differs from its relative in having a simple mine, and three chambers instead of two. The mine is a small oval blotch, very like the mine of an *Ornix*, and lies on the underside of a leaf, generally close to the edge. The three chambers are all alike, except in the matter of size, and are simple turnings-down of the edge of the leaf, like the chambers of *Ornix avellanella* on nut. The larva is indistinguishable from the birch form *elongella*. It spins up just under the edge of the leaf, curling it neatly over; and in this again it resembles an *Ornix*."

A single-brooded species, the larva being found in July and August and the imago from September to April.

Scarce and local; only known from Kent, Surrey, Hants and Hereford.

11. *alchimiella* Scop.

10-13 mm. Forewings ferruginous, with a violet gloss; at the base of dorsum is a short yellow streak. A large triangular yellow median costal blotch, sometimes extending nearly to the apex along the costa. Hindwings dark grey.

Larva greenish-white, head yellowish. Feeds within conically rolled leaves of oak. The larva commences to feed by making a narrow, twisting, thread-like mine, terminating in a blotch, on the underside of a leaf. On leaving the blotch the larva goes to the edge of a leaf and turns a small portion of a lobe downwards and feeds within. Finally, the larva rolls up the lobe of a leaf into a rather large cone.

Pupates in a white, shining, silken cocoon constructed near the edge of a leaf.

A double-brooded species, the larva being found in July and again, and much more plentifully, in September and October. The imago flies in May and August.

Common and widely distributed over most of the British Isles.

12. *azaleella* Brants.

10-12 mm. Palpi whitish-yellow, apex black. Head light violet-grey, face whitish-yellow. Forewings violet-brown. A golden elongate blotch along costa from about $\frac{1}{4}$ to $\frac{4}{5}$ ths, broadest anteriorly and reaching $\frac{2}{3}$ across wing. Costal edge of blotch minutely dotted black. Hindwings

1 Auroguttella.

2 Phasianipennella.

3 Hemidactylella.

4 Alchimiella.

5 Sulphurella.

6 Cuculipennella.

7 Tringipennella.

8 Syringella.

9 Azaleella.

10 Populetorum.

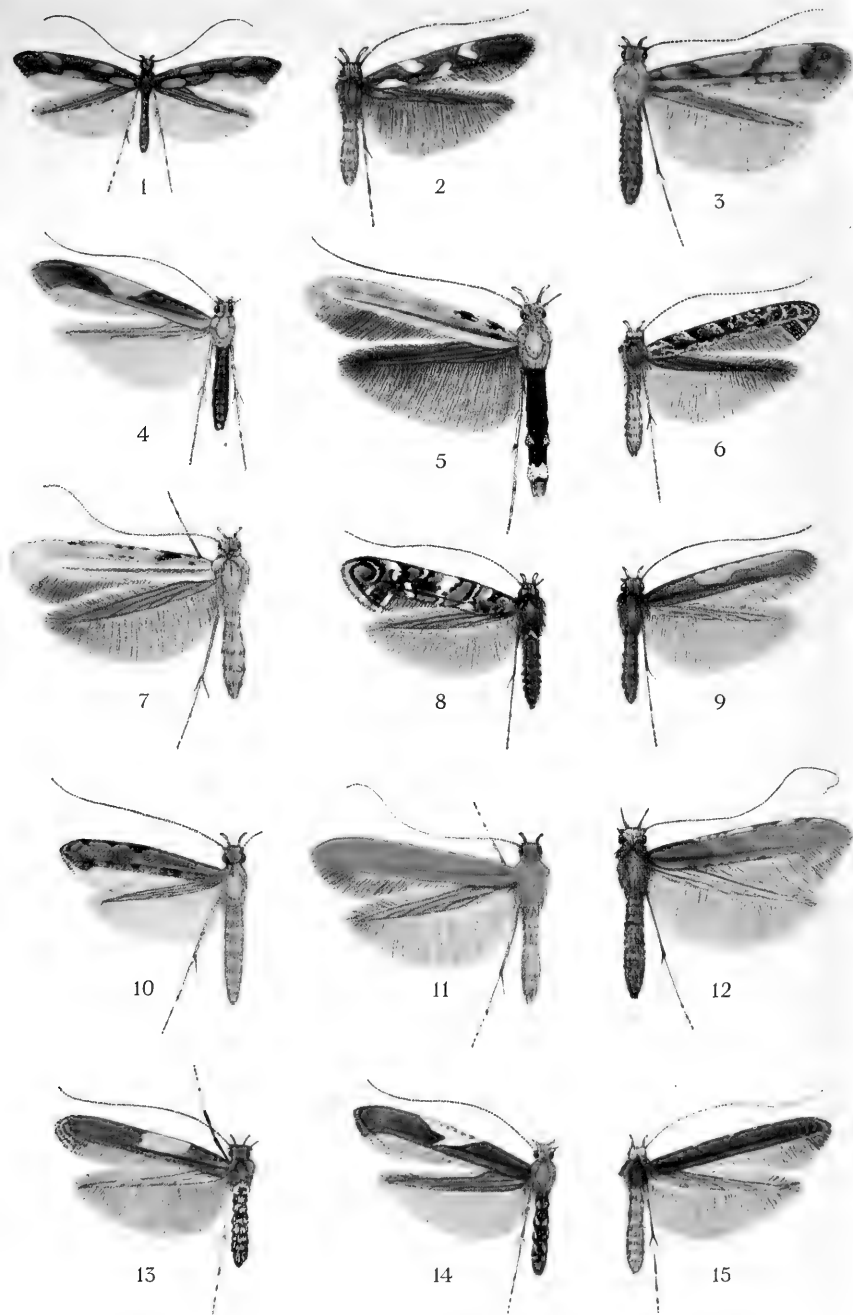
11 Elongella.

12 Falconipennella.

13 Pyrenaeella.

14 Stigmatella.

15 Semifascia.



F. C. Fraser del.

CALOPTILIA HÜBN., A GENUS OF TINEINA.

grey. Larva pale greenish-yellow, head pale brownish-yellow. Feeds within conically rolled leaves of evergreen *Azaleas*.

The larva commences to feed by making a short twisting mine terminating in a *Lithocolletis*-like blotch beneath a leaf. Occasionally the mine is absent, and then the blotch becomes the first stage. It then quits this mine and goes to the tip of a leaf, which it turns downwards and backwards and fastens with silk. The larva feeds on the underside of the leaf within this cone. It constructs two cones before becoming full-fed.

Pupates in a white silken cocoon beneath a leaf. A well-known greenhouse pest on *Azaleas*. In such situations there is a succession of broods.

Has been naturalised out-doors for a good many years in Bournemouth, where it is abundant. The imago flies in May and August, and the larva is found in June and September. Passes the winter in the pupal state.

13. *pyrenaeella* Chrétien.

10-11 mm. Forewings purplish-brown, violet tinged. Base of dorsum purplish-yellow. A large trapeziform, rarely triangular, golden median costal blotch. Cilia purplish-brown. Hindwings dark brown.

Larva fusiform, elongated, very attenuated posteriorly, white, head white, mouth parts ferruginous. Within conically rolled leaves of Maple. The larva is a miner at first, later on making cones of the lobes of the leaves. It emerges from these by cutting a hole in the side. Pupates in an elongated white silken cocoon spun up in a fold of a leaf. The larva has been found in June. The imago has only been found in June and July. A second brood has not been observed.

Found on the Continent in the Basses-Pyrenees. In the *Entomologist*, LXVI, 230 (X. 1933) Mr L. T. Ford recorded that he bred specimens of this species from cones on Maple leaves collected in the Isle of Wight on 9.vi.1933, the moths emerging 2-4.vii.

14. *semifascia* Haw.

10-12 mm. Forewings variable in colour; sometimes of a uniform dark reddish-brown with all markings obscured. More frequently reddish-brown, mixed pale yellowish, with an oblique ochreous-white dark-edged streak from costa before middle to fold, apex bent outwards. Several dark reddish-brown dots on costa. Hindwings dark grey.

Larva pale greenish, dorsal line darker, head pale brown. In conically rolled leaves of maple. The larva commences to feed by making a rather long, narrow mine beneath a leaf; generally running downwards towards the footstalk, where it makes a small flat blotch-mine. Sometimes the mine is absent and the blotch becomes the first stage. On vacating the blotch-mine the larva goes to the edge of a leaf, where it turns a small portion over and under and feeds within. The next stage consists of a portion of a lobe being rolled up into a little cone. Finally,

the larva rolls up the whole of a lobe of a leaf into a cone, neatly fastening the edges down with silk. The shining yellowish-white silken cocoon is usually found near the edge of a leaf.

This is a single-brooded species, the larva being found in July and the imago appearing in August and September. It hibernates and appears again in the spring.

Fairly common but local in England. Unknown in Scotland and Ireland.

15. *stigmatella* Fabr.

12-14 mm. Forewings reddish-brown, darkest on the anterior margin of the costal blotch. A triangular white median costal blotch, faintly clouded with reddish-brown; a few black dots along costal edge, apex towards dorsum emitting an outwardly oblique streak. Hindwings grey. A not uncommon form occurs in which the reddish-brown ground colour is replaced by ochreous-grey.

Larva whitish-green, head yellowish. Within conically rolled leaves of various species of *Salix* and poplar. The larva commences to feed by making a small *Lithocolletis*-like blotch beneath a leaf. It then leaves this mine and goes to the tip of a leaf, often the same leaf, which it turns over after the manner of an *Ornix* larva. The larva feeds on the undersurface of the leaf within and constructs two of these abodes before making a cone proper, which it does by folding the tip of a leaf over and downwards for about $\frac{1}{2}$ in. When the food-supply has become exhausted the larva leaves its abode and constructs another. It thus constructs two cones before becoming full-fed. The white silken cocoon is constructed on the underside of a leaf, generally near the edge.

The imago appears in September and October, hibernates, and is on the wing again until May. The larva is to be found in August and September.

Widely distributed and fairly common over most of the British Isles, except Ireland, where it is scarce and local.

16. *hemidactylella* Schiff. 1775 (*hemedactylella* Fabr. 1787).

12-14 mm. Forewings light ochreous-yellow, mixed and strigulated red-brown; a large triangular paler median costal blotch, on costa marked with several blackish dots, anteriorly margined by a suffused dark reddish-fuscos fascia. Hindwings grey. (Meyrick). Can be distinguished from *falconipennella* or forms of *elongella* by the distinct fascia which forms the anterior margin of the costal triangle.

Larva pale yellowish-green, head paler than the body. (Stainton). Feeds within a conically rolled lobe of a leaf of sycamore. Nothing appears to be known about the early stages of the larva.

This is a single-brooded species, the larva being found in July and August and the imago from September to May. A very rare species, which does not appear to have been taken for many years.

Distribution given by Meyrick as S.E. England to Dorset, and Norfolk, Derby, Cheshire, Westmorland and S. Ireland. It is now known that a number of old records for *hemidactylella* were based on erroneous identifications.

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NOTES ON COLLECTING IN KENT, 1946.

By G. V. BULL, B.A., M.B.

Read 13th November 1946.

I spent the greater part of July in Dr Scott's house at Westwell, near Ashford, Kent. Some of you may know the house, about 500 feet up, facing S.E. above the Pilgrims' Way. There is a bank of Valerian in front of the house, a rough field full of St John's Wort, Scabious, Knapweed and Trefoil, beyond that a Beech wood, and further back a disused chalk quarry. Incidentally, eleven different kinds of *Orchis* have been found almost within a stone's throw of the house. The field was full of *Maniola jurtina* L., *Melanargia galathea* L., and *Aphantopus hyperantus* L. Just before my arrival *Lygephila pastinum* Tr. (a new insect for that neighbourhood, though it is taken at Wye not far away) had been plentiful on Valerian and at light, but I only saw single specimens three times after my arrival. The evenings for the most part were cool and dewy, but I sugared a few posts and had a light in the garden on most evenings, though seldom after midnight. The first few evenings the Valerian was swarming with *Plusia gamma* L. (as also in the daytime) of all sizes and colours, from the natural colour to yellow: on netting the yellow specimens they were found to be almost scaleless. There were also a few *Macroglossum stellatarum* L. and *Deilephila porcellus* L., one of the latter being taken at light on my first evening. *Heliothis peltigera* Schiff. was seen on three occasions from 3rd July onwards, *Vanessa cardui* L. (worn) on 5th July, and *Cobias croceus* Fourc. on 8th July, by which date most of the *P. gamma* had disappeared. Altogether I noted some 125 species, a few of them in Ashford and at Wye.

I had taken with me a *Lasiocampa quercus* L. ♀ in hopes of assembling, but apparently the species does not occur thereabouts, as nothing happened till 9th July, when a pair emerged in my cage and the male paired with both females. I let him go, and think he probably came back next day to pair with a third female, but as I had not marked him I cannot be sure.

My best nights were 20th July, 27 species; 22nd July, 39 species; and 26th July, 25 species. *Stauropus fagi* L. appeared on 20th July, *Pheosia gnoma* F. (= *dictaeoides* Esp.), *Notodonta ziczac* L., *Lophopteryx capucina* L., and *Tethea duplaris* L., one of each and never again. *Melanthia procellata* Schiff., *Horisme tersata* Schiff. and *Ortholitha bipunctaria* Schiff. were fairly plentiful. I had an exciting few minutes on my last night when five *Gastropacha quercifolia* L. were flopping about the sheet at the same time. Other interesting captures were *Eupithecia succenturiata* L. (new to Westwell), *Xanthorhoë quadri-fasciaria* Clrck., *Jaspidia pygarga* Hufn., *Eilema complana* L., and *Axylia putris* L. At sugar *Polia advena* Schiff., *Xylophasia sublustris*

Esp. and *Scopula ornata* Scop. were taken. In Ashford itself *Cryphia perla* Schiff. and *Sterrha virgularia* Hb. were common on walls and palings and *Itame wauaria* L. was taken on one occasion.

I visited Ham Street by day on 12th July and *Argynnis paphia* L., *A. cydippe* L. and *Aphantopus hyperantus* L. were flying in some numbers, but I only saw 2 *Limenitis camilla* L. (paired). *Maniola tithonus* L. was conspicuously absent as everywhere in my experience, but later I saw many at Ham Street in a wood on the way to Ruckinge (11th August).

I went back to Ashford for the latter half of August. *Cryphia perla* and *Sterrha virgularia* were still sitting on walls and palings. I only collected at Westwell on two occasions and took *Notodonta dromedarius* L., *Tholera cespitis* Schiff. and *Hydroecia micacea* Esp. among other things. During that period Dr Scott also took *Triphosa dubitata* L., *Hepialus sylvinus* L., *Calostigia olivata* Schiff., *Sterrha inornata* Haw. and *Gnophos obscurata* Schiff., also larvae of *Heliothis peltigera* Schiff. feeding on marigolds. At Wye I took a few good undersides of *Lysandra coridon* Poda of both sexes.

ENTOMOLOGICAL REMINISCENCES.

By Major H. S. FREMLIN, M.R.C.S., L.R.C.P., F.R.E.S.

Read 13th November 1946.

The advantages that I have had from being in this Society for so many years have included not only the exhibition of many rare species but also the views of expert lepidopterists on them. It was my privilege in the early days to receive much help from Mr T. W. Hall, who introduced me to this Society. Then there was Mr R. Adkin, who, I felt, represented this Society in one of its best periods; and again Mr South, with his great knowledge and helpfulness.

About 1900 I asked Mr Adkin where I should go to collect. After considering Killarney, he said that no one had been to the Hebrides, so I went to Stornoway in the Isle of Lewis at a time when this town of 5,000 inhabitants had 20,000 people for the herring season. Thanks to the local doctor, after several places where there was no room had been tried, very nice rooms were found for me in a farmhouse about a mile out of town. This was near the only wooded place in the Island, and I was able there to get interesting northern species.

I must also mention one who, although not a member of this Society, nevertheless gave me good advice and also rare species, far beyond any that I could have obtained by exchange. This was the Rev. Canon Bernard Smith of Great Marlowe. I first got in touch with him when I offered *chaonia* pupae in exchange. He was very interested, and after sending me species in exchange he invited me to his house. There he brought out a case, and on opening it I saw several British bred *alni*! I, who so far did not possess one, had never seen so many in my life. Naturally I was keenly interested, and on being invited to help myself said "I should like one." "One," he answered, "take as many as you like; if you don't other people will." He later on gave me some ova of this species, from which I was able to raise an equal number of imagines. Later on still he offered me some *carmelita* pupae, and breaking off part of the soil in which they had pupated gave them to me. Also he gave me many ova of *plumigera*, laid on a piece of muslin covering the holder in which they hatched, and I was able to rear the species for some years. I must not forget to mention his giving me specimens of *Eupithecia insigniata* bred by Mrs Hutchinson.

I was very pleased to learn that he wanted pupae of *fagi*, as this enabled me to make some return for his generosity.

I would like now to mention a few species in which I have been particularly interested

Aglais urticae.

I have bred many hundreds of this butterfly, both to obtain varieties and also to note the action of certain acid fumes on the pupae.

The most striking natural variety was one that I consider hatched prematurely. It was not able to fly and died in a few days. The wings were quite limp and could not be used for flight. Also the ground colour of the wings was brown, showing only the black markings—no yellow or blue spots. In addition to the above premature characteristics it happened also to have a fusion of the two upper black markings in the centre of the forewing.

Apart from the natural varieties, I produced a number of artificial ones by exposing pupae to the fumes of hydrochloric and nitric acids and chloride of lime for some days until they hatched. The result was that in some the varied colours merged into a dull yellowish-buff.

Stauropus fagi.

On 20th June 1883 I was catching moths in Mereworth Woods in Kent; I netted a large moth but it was too dark to examine it. On reaching home I found that it was a female *fagi* and kept it for eggs. It laid 17; when they hatched they were kept separately, indoors. It was noticed that they changed skins before feeding. Of the 17 only one lived! Any of you who have not bred this species might think, when it first emerges, that you had ants in the box! I told Mr Hall that I had caught a female—he said that this was not usually done as they were chiefly found on trees. So the next year I looked for them on trees and found three females. I got a lot of eggs and wondered what to do with them, my first attempt having been so disastrous. I asked Mr Hall, and he took over a number of eggs, some of which hatched in the post. However, I sleeved a good number and got about 100 pupae. I made an attempt at breeding some; I understood that they should pair on the second day. I lost five moths in this attempt, never hatching a pair on the same evening. They emerge at 10.30 p.m.

Drymonia chaonia.

I found this moth in May 1888 and at once put it in my cyanide bottle. Soon afterward I thought that it would be damaged in the bottle and put it into a box. It laid over 100 eggs, as far as I remember. These eggs hatched and I obtained a good number of pupae.

Ptilophora plumigera.

This Prominent is very easy to manage. The pupae are kept in a holder containing some depth of soil and having a cover of muslin. When the moths are hatched one leaves them until they are dead; then they can be set, as one finds that they never damage themselves and lay all their eggs on the muslin. It is thus very easy to keep a colony going for a considerable number of years.

Euchloris smaragdaria.

I was introduced to this species by Mr Auld, a member of our Society. He had found numerous larvae but could not bring them through the

winter. The larva feeds on Sea Wormwood. This plant has rather needle-shaped leaves, and the larva decorates its back with these, placing them on points where they adhere (presumably due to a sticky secretion), thus rendering it less easily seen.

I soon found several, and put our combined catches on the Southern Wood that grows in gardens, and they got through the winter. They are full grown in the spring, pupating on the plant. I was able to hatch 100%, sending the pupae on to Mr Auld. I wished to learn when the larva began to decorate itself with the leaves. To this end I got eggs from bred moths and found that they applied the leaves to their backs very soon after hatching.

Callimorpha quadripunctaria.

I caught several of these moths and saved some for eggs. I got many eggs but failed to bring the larvae through the winter. Mr Jaeger, a member of our Society, was however very successful.

Palimpsestis fluctuosa.

I used to catch this moth fairly frequently in the wood near my home. One day I was out with one of our Field meetings and found one on a thin shoot, with its wings folded round, resembling a bird dropping. Later on Mr South told me that near where I had found this moth I could, by beating the surrounding bushes, have knocked out a female. This I tried on finding a further specimen, and succeeded in getting a female, which I then sleeved on a birch. I found one egg on the tip of the serration of the leaf, but could find no larvae later on.

One of my most difficult problems was the setting of a Bee Hawk Moth. When this hatches the clear parts of the wings are covered with black scales. After the wings are dry the moth vibrates them gently and all these fall off. Until the wings are well expanded one can do nothing. Then we must send it to sleep so quietly that it does not shake off these scales.

LEPIDOPTERA OF FOLKESTONE.

By A. M. MORLEY, O.B.E., M.A., F.R.E.S.

Read 27th November 1946.

In the Autumn of 1927 I was transferred, not unwillingly, from Liverpool to East Kent, and the Powers-That-Be intimated that I might settle in any convenient centre. Perusal of the works of Richard South and other books of reference showed that Folkestone was a highly convenient centre, and fortunately this view met with official approval.

Mid-October was not the best time of the year to begin exploring a new district, but the next few months might well be used to get into touch with local entomologists and to find out what interesting species were to be obtained here, and where and when they were to be looked for.

Unfortunately, there appeared at first to be no local collectors. It was as though a long tradition had died out and no one living remembered its details.

No doubt in the 1850's and '60's, Folkestone, rapidly developing from a fishing village into a fashionable seaside town, attracted, as it still attracts, entomologists from many parts of England. It was one of those happy periods when hard work was certain to result in discoveries, and in less than 20 years the locality produced 12 new British species (including micro-lepidoptera). Many of these were discovered by visiting collectors, but there was one famous entomologist in Folkestone who must rank high among the pioneers. That was Dr Guard Knaggs, not only a collector but a writer on entomology and an editor of the *Entomologist's Monthly Magazine*. It was he who in 1858 discovered *Arenostola morrisii* or *bondii*, which might quite well have been called Knaggs' Wainscot. The controversy that raged about this insect is well known—how it was first regarded as identical with *A. concolor*, then as a form of *Petilampa minima (arcuosa)*, and then as *A. extrema*. It was Staudinger who finally decided that *concolor* was the same as *extrema*, and *morrisii* a new species. Knaggs fought hard to maintain its specific rank, and it is a pity that the name he gave it has been superseded.

In 1859 he found, on the road below the Leas, 11 larvae of *Clostera anachoreta* feeding on stunted poplars. He was so successful in breeding from them that Edward Newman, writing in 1869, was able to say that the species "now abounds in all our cabinets."

Whether C. A. and T. H. Briggs are to be regarded as local collectors or not I do not know. They certainly spent a good deal of their time in Folkestone, and it was they who, in 1869, while undergraduates at Oxford, took the first two specimens of *Leucania albipuncta* while sugaring along the road leading to the Warren. That place does not

seem to be very good nowadays, but no doubt conditions have changed. C. A. Briggs, then described as of Lincoln's Inn, collaborated with H. Ulyett and W. Purdey in the production of a List of Folkestone Lepidoptera, and the T. H. Briggs Collection, which was sold at Stevens in 1917, contained many specimens from Folkestone. Among them the following may be mentioned:—*Celama aerugula* (*centonalis*), three, Folkestone, 1882; *Eilema caniola*, two, Romney Marsh, 1895; *Utetheisa pulchella*, one, Folkestone, 1874; *Clostera anachoreta*, 23, bred Folkestone, 1862; *Leucania albipuncta*, 10, Folkestone, 1868-76; *Rhodometrus sacraria*, one, Hawkinge, near Folkestone, 1865; and *Perconia strigilaria*, 16, Folkestone. I have heard that the last-named used to be taken above the Downs, but have never come across it.

The mantle of Dr Knaggs, or at least a considerable portion of it, descended on the shoulders of H. Ulyett, a keen all-round naturalist and a lively writer, in a rather fruity Victorian style. He was a contemporary of the well-known professionals, Purdey and Austen, and used to collect with two amateurs, Blackall and Giles. The collection of the last-named is in the Folkestone Museum, but is unfortunately almost devoid of data. No doubt most of the specimens are local, but the only one about which I feel at all certain is a beautiful silver-white *Lycæna phlaeas*. In the same museum is the large collection of another local entomologist, Colonel Le Grice, which as a whole suffers from the same defect as the preceding. Here I might mention Mr J. W. Walton, who has been for many years and, I am glad to say, still is, the very able secretary of the Folkestone Natural History Society. He is a botanist, but between 1895 and 1900 he collected lepidoptera with zeal, and took species which I have been unable to find, such as *Lithosia quadra* and *Mythimna turca*.

For practical purposes the line of collectors ended with Stuart G. Hills, who died shortly before I came to Folkestone. It was he who took *Nymphalis antiopa* in 1908. A fellow golfer once told me that he was playing a round with Hills a long time ago when they saw a butterfly sitting on a willow tree. Hills said: "That is a Camberwell Beauty and worth £2. I must go home and get my net. It will still be there when I come back." And it was. I have mentioned the two famous professionals, Purdey and Austen. Purdey died not long before 1925, but Austen, a scene shifter at the local theatre, was still about in 1937. Many of you will remember a very old man, well over 80, who somehow or other managed to get to the Downs after *Lysandra bellargus*. His collection also is in the Museum, but all his best things were, of course, sold, mainly, I am told, to Rothschild. Whether from natural caution or failing memory he was not very communicative. However, he told me a few things: how he used to take plenty of *Scopula nigropunctata* (*strigilaria*) in one particular spot in the Warren; how once from the root of a large water dock he bred 100 *Aegeria chrysidiformis* and sold them for a shilling each; how in October 1878 he had eight *Utetheisa pulchella*, mostly brought to him by people who had found them near

the beach; and how, at about that time, *Lithosia quadra* appeared in the town in considerable numbers. He told me also that at the time when *Hadena albimacula* was regarded as a great rarity (Edward Newman, writing in 1869, knew of two British specimens only) a professional, whom we may call Mr A., started a roaring trade in the insect, for which he had evidently discovered a local habitation. His rival professional, Mr B., used to follow him about, in the hope of sharing the loot, but Mr A. was too "fly" and led him in every direction but the right one. Finally, Mr B. bribed a linesman on the railway, who was able to report that Mr A. was fond of visiting Lydden Spout, beyond the Warren. They met there, but relations were not friendly. There was a third professional, Bailey, not so well known as the other two, who used to collect for Sidney Webb. One day in 1928 Mr R. C. Crewdson and I were collecting *Cupido minimus* in a valley near Folkestone when what appeared to be an ancient tramp came up to us. We expected a demand for the price of a drink, and were surprised when he asked: "Have you seen any *Colias* this year?" He told us that having reached the age of 80 he had retired from active collecting, but that for many years he had worked as an entomologist, earning just enough to live on but enjoying the life. He had once bred from larvae found at Temple Ewell three white *Abraxas grossulariata*, which he had sold to Sidney Webb for £3; once he had caught, at a spot which I have since visited without success, five specimens of what he called "pink *aegon*;" and on one never-to-be-forgotten day he had taken on the Downs two black males of *Lysandra bellargus* and a black *Argynnis aglaia*. That was not on the famous Middle Hill, on which, apparently, he never collected, but at the North Eastern end of the Downs. Others among the old collectors have referred to the richness of this part of the Downs in *L. bellargus*, but something seems to have driven them away. At any rate, I have never seen more than a few of the insects there at a time and have only taken one good variety, a silvery male.

Having failed to get much information from collectors, I went through the collections in the Museum. There were, as I have said, almost no data labels attached to individual insects, but some of the series had below them a printed label "Folkestone." I made a list of these, but, in the absence of data, it was not very useful. The most interesting were *Leptidea sinapis*, *Celerio galii*, and *Lymantria dispar*. The butterfly, I found out later, used to be common in Reinden Wood, but it does not seem to have been noted for many years. *L. dispar*, according to South, died out about 1850, but I have come across a record of one taken in Folkestone in 1899. Apart from the above there are on the list only three species which have not been noted in the district since 1927:—*Miltochrista miniata*, *Euphyia picata*, and *Euphyia rubidata*. One can hardly doubt that they are still in the district and will in due course be re-discovered by some enterprising collector.

All I could find out about localities was from the Assistant Curator, who told me that practically every good capture had been made on the

Downs, in Reinden Wood, $3\frac{1}{2}$ miles outside Folkestone, or in the Warren. He was not an entomologist but he knew that odd specimens of *Polygonia c-album* and *Nymphalis polychloros* were taken in the Warren year after year. Of the former it may be said that it was rare here until 1934, since when it has been pretty common, especially in September; of the latter, that there is apparently no record of it before 1869, and that though no doubt indigenous not more than one specimen on the average was noted in a season, until the present year, when at least 9 were seen in and about Folkestone.

Later on Austen told me of a fourth locality, the Park Farm, quite near to my house, where he used to collect regularly, and where, in May 1892, he took his *Minucia lunaris* at sugar. The Farm was at that time a genuine park, with large trees, relics of an extension of the Weald. That explains, I believe, why it was possible, perhaps up to 1880, to find in this neighbourhood *Catocala sponsa* and *promissa*. The Farm remains, but the trees are gone, and I doubt whether many woodland species are left there.

After a certain amount of search I was able to get hold of three books which told me a good deal about Folkestone. The first was *A List of Macro-lepidoptera occurring in the neighbourhood of Folkestone*, produced by Dr Knaggs in 1870. The introduction is most entertaining, and tells how in 1856 Mr Brewer, a coleopterist, found the first *Aegeria chrysidiformis* and brought it back in his tobacco box; and how, in August 1867, Mr Bernard Piffard discovered the first *Aplasta ononaria*, no doubt an immigrant. Then Knaggs has something to say about a moth he found on a fence near the Junction station early in June 1861. It had pectinated antennae and he regarded it as new to the British list, but it was in too bad condition to be identified. He assumed that it was related to *Pachetra sagittigera (leucophaea)*, and perhaps that is what it really was. He had taken a single example of *Sterrhia rusticata* in the Warren, and in the same place Mr J. B. Lynch had taken *Scopula rubiginata*. I wonder whether these were casual immigrants, or the last survivors of local species.

The List itself has detailed notes and contains the names of 326 species, if we omit the Pyralidae. It suggests several interesting points. There is, for instance, no reference to *Limenitis camilla (sibylla)* and it looks as if this butterfly was unknown in the district until it suddenly appeared in 1929 in the course of its extraordinary movement from West to East. *Melitaea cinxia* had "not been observed of late years" along the Lower Road, where it had been fairly common up to 1863. *Euphydryas aurinia* was to be found in Reinden Wood; I have not been able to find out when it was last seen there. *Pararge aegeria* was "common inland." It is remarkable that this species should have disappeared entirely from S.E. Kent. Dr Scott tells me that it has not been seen in the Ashford area for many years, and Mr Embry that though it was common around Dover in the early part of the present century it has gone from there. This year David Smith, a Folkestone schoolboy, took

a single specimen at the foot of the Downs. It is possible that after an absence of perhaps thirty or forty years the insect is about to make a come-back. Of *Papilio machaon*, just now the subject of a good deal of discussion, Knaggs says it "has been met with year after year on the East Cliffs, Dover, beyond the Castle, but has not, to my knowledge, occurred in the immediate vicinity of Folkestone." Turning to the moths, one finds that little was known about *Apatele auricoma*, except that larvae were to be found somewhere between Folkestone and Dover; that of *Cryphia muralis* (*glandifera*) two examples only had so far been found in Folkestone; that Knaggs was not acquainted with *Hadena albimacula*; that *Hadena dysodea* was to be taken "flying at dusk"; and that "some years ago" Mr Sidebottom secured a few specimens of *Emmelia trabealis* (*sulphuralis*) on the road below the Leas. Knaggs was apparently not at all interested in varieties.

The second book was a volume of essays by Ulyett on various aspects of Natural History, published in 1880. Among the appendices is a list of Lepidoptera occurring within a radius of six miles from the Town Hall. This is a bare list of names with no information of any kind. "Entomologists," he says, "will appreciate my reasons for not going into particulars in all cases." He had no doubt good reason for caution, but he was over cautious, and his list is in consequence of general and inferential rather than specific interest. For instance, that it contains the names of 531 species as against the 326 in Knaggs' list shows that collectors had been pretty busy in the interval. Actually Ulyett chose to omit the names of seven species that occur in the former list: *Hippotion celerio*, for which the then evidence was not very convincing; *Iasiocampa trifolii*, of which Knaggs thought that he had found cocoons, presumably empty, in the Warren; *Aporophyla australis*, for which, as for *H. celerio*, the evidence was English's Guide;* *Triphaena comes*, an obvious slip on the part of Ulyett; *Eupithecia succenturiata*, which as a matter of fact is not at all rare in Folkestone; and *Eupithecia denotata*, which Knaggs claimed to have found in the Warren.

The additions are for the most part species which still occur in the district, but reference might be made to four among them: *Aporia crataegi*, of which I have seen in a local collection four specimens said to have been taken in the Warren about 1855; *Syntomis phegea*, one of those records that are barely credible; *Panaxia dominula*, about which Ulyett says that many attempts had been made to establish it in the Warren without success; and *Arenostola fluxa* (*hellmanni*), a record as difficult to refute as to confirm.

In his essays he gives us some information, that *Colias croceus* swarmed in 1877 and he was convinced that it hibernated as a butterfly; that in 1872 several *Nymphalis antiopa* had been taken in Folkestone; that *Saturnia pavonia* (*carpini*) used to be common but had not been seen lately; that in June 1869 he had taken all three Foresters on the

*First published in 1859 and containing a list of 14 rare butterflies and moths occurring at Folkestone

Castle Hill; and that in the last three or four years *Hadena albimacula* had been taken in considerable numbers. Like Knaggs, he makes no reference to varieties.

Of the third book, *Folkestone and the Country Round*, published in 1925 by the Natural History Society, not much can be said. The article on Lepidoptera by Stuart Hills is short and general. He mentions that collectors had been so busy searching for larvae of *Aegeria chrysidiformis* that "the dock was almost destroyed and the larvae nearly exterminated;" that a specimen of *Catocala fraxini* was taken in 1895; and that the district had produced some remarkable varieties of butterflies. One sentence in his article is a little surprising: "Caterpillars of the large and rarer hawk moths have been found here or in the neighbourhood, such as the Pine Hawk Moth, the Convolvulus Hawk Moth, the Madder Hawk Moth, the Oleander Hawk Moth." Of the first and the last of these one would expect the moth rather than the larva. Of *Hyloicus pinastri* I have no further information than the above reference, but it is fairly well known that Mr Percy Richards in 1916 found a specimen of *Daphnis nerii* on a tree trunk below the Leas.

By 1928 I had acquired a certain amount of information and I was lucky enough to make the acquaintance of two working entomologists: E. C. Joy, who had recently come to Folkestone, and whose death not long after the outbreak of the war robbed us of a delightful companion and one of the best of friends; and David Saunders, who had worked the Hythe area pretty thoroughly. Joy knew a great deal about moths, but had had to give up collecting them by doctor's orders, and his collection of butterflies, now one of the things most worth while seeing in the Folkestone Museum, was said to be the best one-man collection in the country. With Saunders I did a certain amount of collecting and should have done more if he had not moved to London fairly soon. I remember his taking me one night to a great park not far from Hythe. It was obviously a remarkably good locality with endless possibilities, and we enjoyed excellent sport. The only trouble was that we were four times accosted by keepers, who did not seem to like us at all. We had to decide between flight and a policy of appeasement, and chose the latter, which took up a lot of time. The next day I sent a polite letter to the owner of the park asking for permission to collect there. In reply came a long letter to say that he could not have his game disturbed, and anyhow, as an entomologist himself, he could assure me that no moths were to be had there.

With the coming of spring in 1928 I had looked forward to the discovering of all sorts of rarities, but the results, largely owing to sheer incompetence, fell far below expectations. Still, one can hardly get through a season without some things worth remembering. Joy and I once went to a part of Romney Marsh, which is now perhaps too well known, in a wild-geese chase after *Euphydryas aurinia*. We saw no butterflies, but found larvae of *Lasiocampa trifolii* and *Dasychira fascelina*. The car had been parked on a spot to which an obliging stranger

had directed us. When the engine was started up for the return journey we observed that though the wheels revolved rapidly our position did not change. Examination showed that the car had been busily digging itself into the shingle, with such success that it took four men to dig it out.

In June one's thoughts naturally turn to *A. morrisii*. There was plenty of the foodplant to be seen on the cliffs below the Leas and I applied to the Town Council for permission to collect there. Having obtained permission, by special resolution of the Council, I took a carbide lamp one night and climbed part of the way down the cliffs. Perched precariously on a small ledge I could hardly move, but still managed to catch a few of the insects. It was embarrassing to find that about half the population of the town were standing on the Leas, looking down on me, laughing immoderately and making the rudest remarks. The following summer Joy showed me how easy it was to take a few pill boxes, walk down the road that leads to the harbour, and box the moths as they sit on the grass. To those who may wish to follow this, the easier course, I offer two bits of advice. The first is that *A. morrisii*, though apparently so quiet an insect, soon knocks itself about if left in the box, and the second that French people, who seem to favour this part of Folkestone, while they display a polite and intelligent interest in the proceedings, are so anxious to assist that they are apt to catch in their hands any moth they can reach and present you with the remains.

In the following August I had a piece of good fortune. Joy used to say that he had been collecting for thirty years and that there were only two butterflies that he still hoped to collect: *Plebejus argus* var. *masseyi*, and *Colias croceus* var. *helice*. I was driving along a road to the west of Lympne one day when I saw over the hedge a lovely field of lucerne which was swarming with *C. croceus*, with a *helice* conspicuous among them. That field we worked, in company with another member of this Society, most assiduously, and we seldom visited it without taking 3 or 4 *helice*. Joy obtained ova and bred a drawerful of *helice*, including some remarkable forms. He lived in a hotel and I remember how he had pots of black medick on the window ledge of his sitting-room, where the larvae fed in the sun quite unconfined. Later he had a sheet of what looked like pink cotton wool fastened to the wall of his room. On this were some 150 pupae very neatly arranged, and he used to sit there and watch the butterflies drying their wings. *C. croceus* has, of course, appeared often enough since then, occasionally in numbers, but I have never since seen anything comparable to that field in that year. As so often seems to happen, *C. hyale* hardly appeared at all, but in the following season, when *C. croceus* was scarce, Joy took 16 *hyale* one morning in the same field, after which no more were seen there. In 1934 *C. hyale* was fairly numerous, but the best year I have known for it was 1945, when some 70 were captured or seen on the outskirts of Folkestone.

There were two moths that I particularly wished to find: *Ammogrotis lucerneae* and *Apamea furva*, both primarily Northern or Western moths and both known for many years to occur in the Warren. Of *A. lucerneae* I took a single specimen at light in 1928, and one of *A. furva* at dusk in the following year. It was Colonel Lowe who discovered their headquarters, which is along a cliff path now unfortunately inaccessible owing to a landslide. There they used to occur in numbers. *A. furva*, with which I am told many people have confused *Mamestra brassicae*, has the peculiar habit of sitting at night on iron pipes.

Another species I was after was *Ennomos autumnaria*, which was evidently quite unknown to the old Folkestone collectors. The first I found was a male at the station when I was catching a train for London. It had to go with me in a pill box, and by the time I got back it was rather like a wingless female. A year or two later I caught a female and found that it is one of the easiest of all moths to breed. 1931 was a good year for it and about 40 were taken, mostly by two members of this Society. One of them used to go to bed and then get up at 1.30 a.m. in order to visit the street lamps. The other one did not go to bed, but, having finished his ordinary collecting, used to run round the town in his car in the early hours of the morning. The police were naturally interested in his activities, but his charm of manner was such that they ended by assisting him to climb up the posts. I remember our doctor telling us of an alarming experience. He heard a noise at about 2.30 a.m. and looking out of his bedroom window saw what he took to be a cat burglar swarming up the lamp-post, and was greatly relieved when the figure descended and made off in the direction of somebody else's lamp. After that year captures became fewer and fewer until the moth seemed to disappear altogether. It has now appeared once more, but unfortunately it is the lamps that are disappearing. The Town Council is now providing us with large and inaccessible illuminations which, when the fuel situation allows them to be lighted at all, are calculated to drive any self-respecting moth into outer darkness. It would be tedious to go through the list of interesting species to be found in this area, but perhaps I may mention three in particular.

The majority of collectors who come to Folkestone scour the Downs in search of varieties of *Lysandra bellargus*. Certainly there have been years when good varieties have been fairly numerous, such as 1923 and perhaps 1926, but these have been few. In the 18 years since I came to Folkestone there have been two good years only, 1932 and 1933. It was in the former that the Revd. Stiff took 13 major varieties. In both years the butterfly was to be seen in thousands, but in 1934 the second brood was very thin. This seemed to start a period of decline, for though *L. bellargus* was fairly numerous up to 1939 it varied but little. When invasion appeared to be imminent the Army proceeded to dig a great tank ditch right along the Downs, and unfortunately selected for this purpose the main breeding ground of the butterfly, and this I believe to be one of the reasons why its numbers fell to about a tenth

of what they used to be. We had hoped that it would recover in a few years, but in actual fact there was a further drop in numbers and this year *L. bellargus* has been almost a rarity. However, I have been told that there was an occasion in the past when it almost died out; so perhaps it will flourish yet again.

One day, in May 1929, Joy and I set out for the Warren, equipped with biscuit tins and trowels in search of larvae of *Aegeria chrysidiformis*. We found some larvae in the roots of docks which turned out to be Hepialidae and some in the roots of Sorrel, which were the genuine article. I put mine in a large flower-pot, and there they fed on the roots all the summer and no doubt most of the winter, to pupate in the following May or June. The moth itself is not easy to find, for it is very local, uncertain in the time of its appearance, and particular about the weather. Moreover, it does not look at all like a moth when flying and shows surprising activity when one tries to net it. Like *Aplasta ononaria*, it seems to have flourished during the War, although the Warren was used as a training ground for Commandos. At any rate, during the last summer I saw about sixteen in one small area.

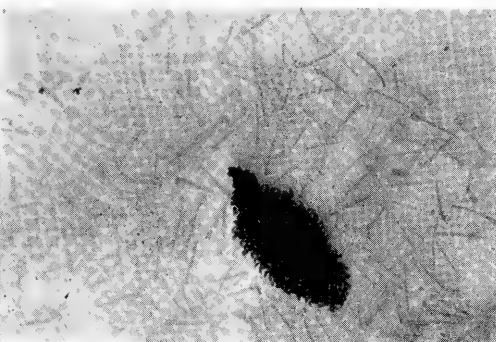
My search for *Hadena albimacula* resolved itself into a search for *Silene nutans*, which is not a common plant. In 1929 I managed to find a patch of it in the Warren and, following what I understood to be the practice of experts, I went there on seven evenings and lay on the ground gazing earnestly at the *Silene*. The only moth I took was *Deilephila porcellus*, but on the last visit I found ten very small larvae which in due course converted themselves into ten *H. albimacula*. A year or so later I found a place, familiar to many in this room, where the moth is nearly as abundant as its food-plant.

In 1931 I rather rashly undertook to produce a revised list of Macrolepidoptera of the district, which the Natural History Society decided should be made to include Romney Marsh. This list is a very amateurish affair which badly needs to be re-written. Although it was intended only as a trial effort, it added 30 new species to Ulyett's list, of which four only came from Romney Marsh, and brought the total up to 561. The additions were largely due to the work of visiting collectors who were very kind in telling me of their captures. Some of the species had obviously been overlooked by the old collectors, who, it must not be forgotten, had no cars. Some were casual immigrants and some, such as *Ennomos autumnaria* and *Polychrisia moneta*, were probably colonists from abroad.

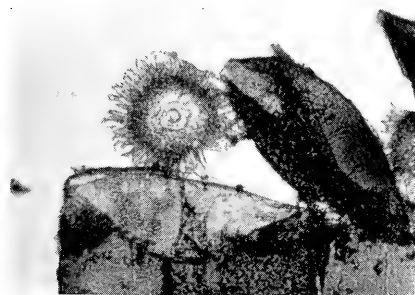
A thing that struck me as rather odd was that there was no record of *Argynnis paphia*, an insect that could hardly be overlooked if present. Joy used to say that it did not occur in the district at all, and his knowledge of local butterflies was very considerable. I had evidence that it was to be found about mid-way between Folkestone and Canterbury, but could hear of nothing nearer than that until 1945, when one was seen in Hythe. Yet, last summer, Mr Wykes and I saw several in Reinden Wood. Perhaps this is another come back, after a very long interval.

During the 15 years since the list was made the number of additional species either captured or unearthed from old records is quite surprising. The total is now about 620, of which 527 have actually been seen or captured since 1927. Both these numbers are likely to be increased to judge by the success of a young friend of mine, David Smith. He started in 1943 at the age of 11 by breeding *Celerio livornica* and capturing *Nymphalis polychloros*. Then he found three species which we had failed to discover since 1927:—*Phragmatobia fuliginosa*, *Gastropacha quercifolia*, and *Abraaxas sylvata*, after which he bred *Papilio machaon* from a larva found near his house. Last year he discovered an entirely new species for this part of the world, *Thymelicus lineola*, which older collectors had been overlooking for years, and among his first few specimens of *Lysandra bellargus* picked up two good varieties in a bad season.

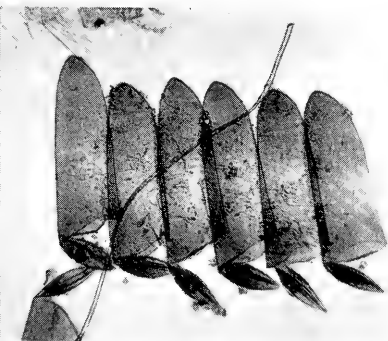
No doubt this is partly beginner's luck, like that of another young friend of mine who was about to start a collection. He decided to begin with the Cabbage White and went to the Warren, where he soon caught a dozen. When he got home he was puzzled to find that one of them had green spots underneath the hindwings, which reminds me of a lady who once rang me up to say that she had just seen 12 Bath Whites at a spot beyond the Downs. She was quite certain about it, as she had looked it up in South: so I went there pretty quickly, only to find that it was a fairly good place for *Melanargia galathea*.



1



4



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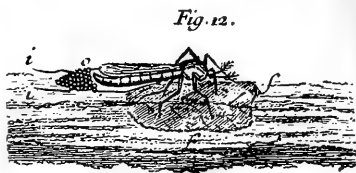


Fig. 12.

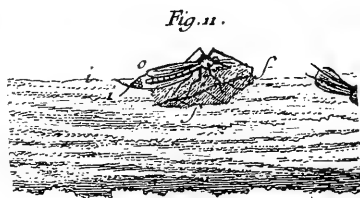


Fig. 11.

2



5

THE EGG-RAFT AND LARVA OF CULEX.

By E. J. BUNNETT, M.A.

Read 11th December 1946.

A little concrete pond in my garden provides me with a number of interesting live objects throughout the seasons.

Early in June come gnats, which construct their curious little egg-rafts on the water (fig. 1). The raft is composed of from two to three hundred cigar-shaped ova, resting on the surface, laterally adherent, with their long axes vertical and the pointed ends uppermost (fig. 3). The texture of the egg shells is such that it is impossible to wet them.

L. O. Howard, writing the life-history of *Culex pungens* in *The Insect Book*, says "the eggs are laid before dawn, and in warm weather will hatch by two o'clock in the afternoon of the same day."

After writing what I considered a possible explanation of the way the shape of the raft could be brought about, in the assumption that the eggs were deposited directly upon the water, there remained the problem—"How were the first two or three made to stand upright upon the surface film?"

Later, having turned up my copy of Réaumur's *Illustrations to the "Memoires,"* I found drawings¹ showing the method adopted by *Culex pipiens* which shattered my hypothesis and at the same time afforded a convincing clue to the unsolved problem (fig. 2). The figures drawn by this remarkable and usually accurate naturalist more than two hundred years ago tell their story so clearly that no apology is needed for their reproduction here.

From these illustrations it is seen that as the eggs are expelled they are held in the angle between the two hind legs, crossed at first, of the gnat, and the width of the raft increases as the angle widens. Thus the boat shape of the raft is accounted for. When completed it is dropped upon the water and left to the mercy of the elements. After the hatching a fringed disc remains in the lid of the shell (fig. 4).

Both Howard² and Carpenter³ give a minute drawing of this disc but without any reference to it in the text. As far as I know, the purpose it serves has not been described.

THE LARVA.

The larvae of *Culex*, commonly known as "wrigglers," are usually abundant in water butts and stagnant water everywhere. They rise frequently to the surface in order to breathe, breaking the surface film by thrusting through it the tail end in which are situated the extremities of the main tracheae.

¹Mem., 13, Tom. 4, Pl. 44, Figs. 11 and 12.

²The Insect Book, p. 105.

³Insect Transformations. Fig. 102.

The living larvae being translucent in the water, like those of many aquatic insects, afford excellent opportunity for examining the disposition of internal organs.

For example, the course of the tracheae being filled with air in the live larvae may be seen running from head to tail in a double line (fig. 5). As soon as life is extinct the whole body quickly becomes opaque, when the breathing tubes, etc., cannot be so readily detected. At the tail end of the larva there are four laminate appendages, which when lying flat upon the surface may serve as supports during the breathing intervals, as well as for the inspiration of oxygen while the larva is under water.

Prof. L. G. Miall, in the history of this gnat in his *Aquatic Insects*, gives a figure of the larva showing five of these anal appendages [p. 98, fig. 22]. My late friend, William Harvey, of Eastbourne, an experienced observer of pond-life, wrote to the Professor a letter pointing out the error in his figure, enclosing a photograph he had made which distinctly showed the correct number to be four, at the same time maintaining the superiority of a photograph over a drawing with respect to its accuracy. Prof. Miall sent a courteous reply acknowledging the error, together with a fine photograph of himself which Harvey always highly prized.

When the larva is ready for hatching, pressure is exerted upon a sort of lid or cap at the lower end of the egg, until the cap becomes detached except at one point or hinge which remains attached to the rim. The larva thus escapes from the submerged end of the egg directly into the water.

EXPLANATION OF PLATE.

1. Egg-raft with newly hatched larvae. $\times 5$.
2. Illustration from Réaumur.
3. Eggs after hatching. $\times 45$.
4. Egg-shell and cap. $\times 160$.
5. Larva. $\times 40$.

ADDENDUM.

Following the reading of this paper, Mr E. W. Classey called attention to a paper on the same subject, read to the Royal Ent. Soc., June 1945, by Sir Rickard Christopher, which gives a fuller account of the gnat *Culex* and its egg-raft, and describes the structure and functions of the eggs in more detail.

Mr Bunnnett remarked that this paper had not hitherto come within his knowledge; at the same time, he thanked Mr Classey for contributing this useful information.

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